Vol. XXVIII. Part 4.

NATIONAL MUSEUM OF VICTORIA

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The Journal of the Department of Agriculture of Victoria, Australia.

April, 1930.

PRINCIPAL CONTENTS

Meadow Hay Competition
Poultry Diseases
The Progress of Herd Testing
Crop and Fallow Competitions
Control of Orchard Insect Pests
Pig Keeping — Sty v. Open-air Methods

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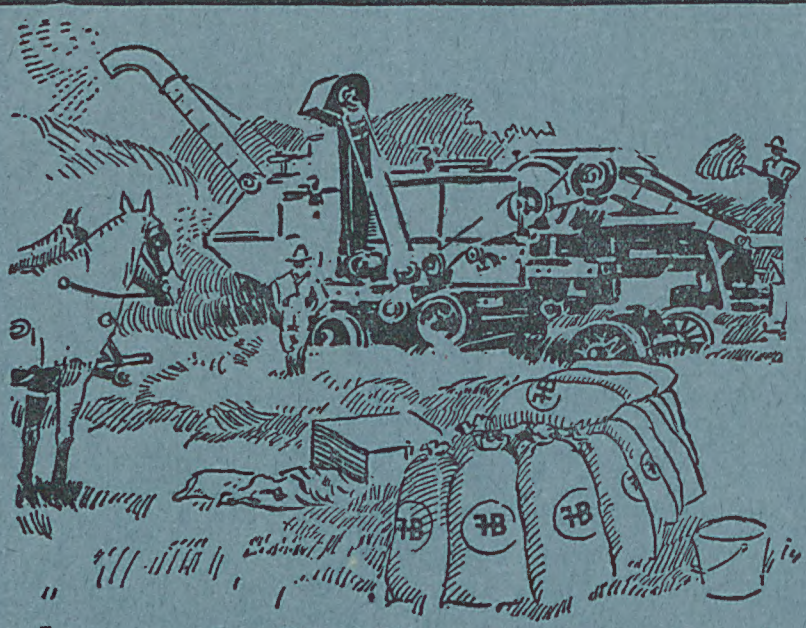

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THE JOURNAL

OF

THE DEPARTMENT OF AGRICULTURE

VICTORIA, AUSTRALIA.

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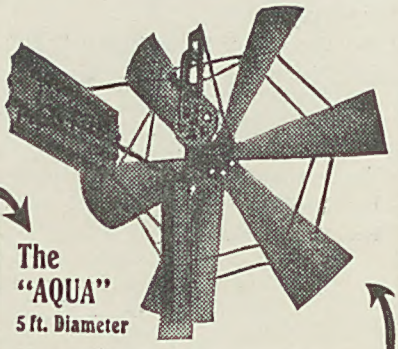

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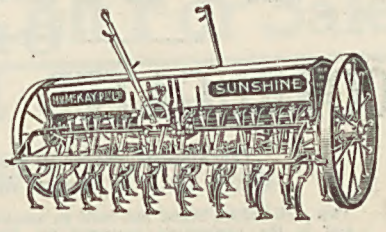

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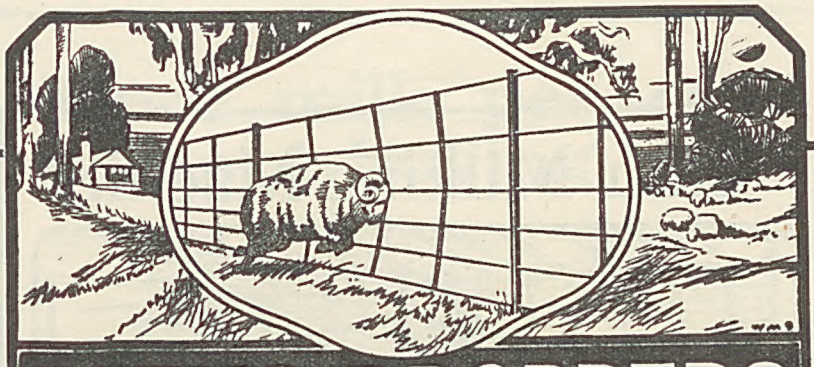

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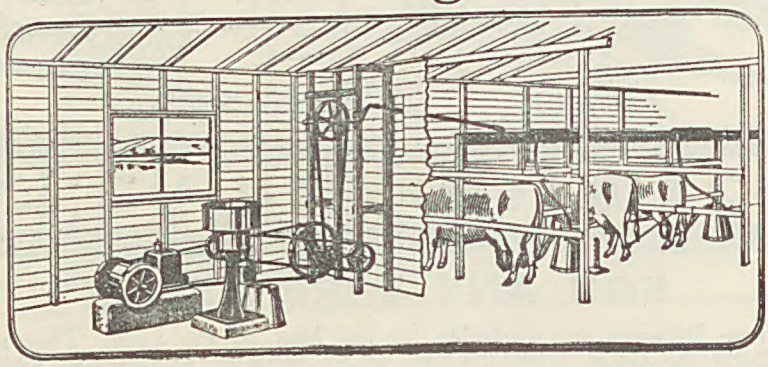

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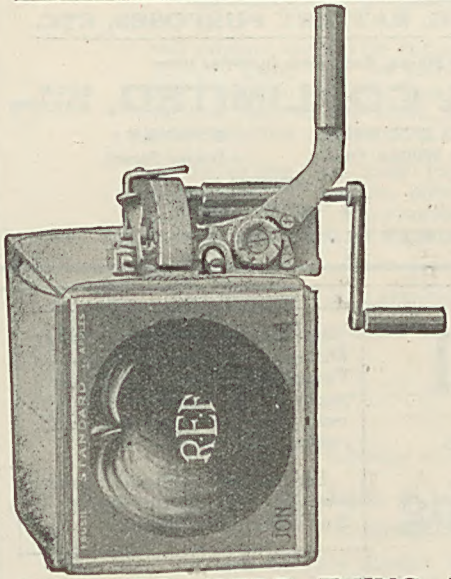

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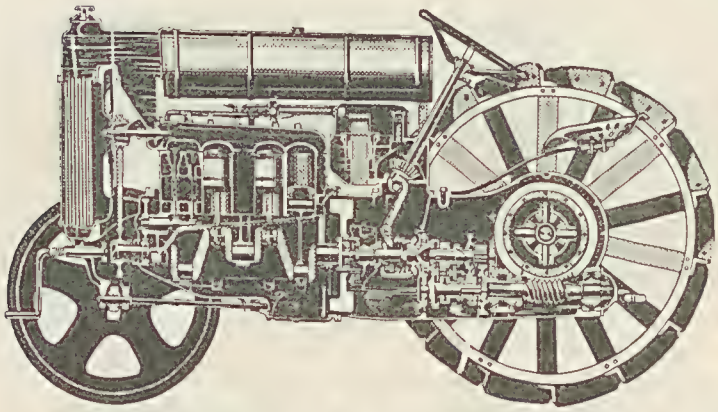

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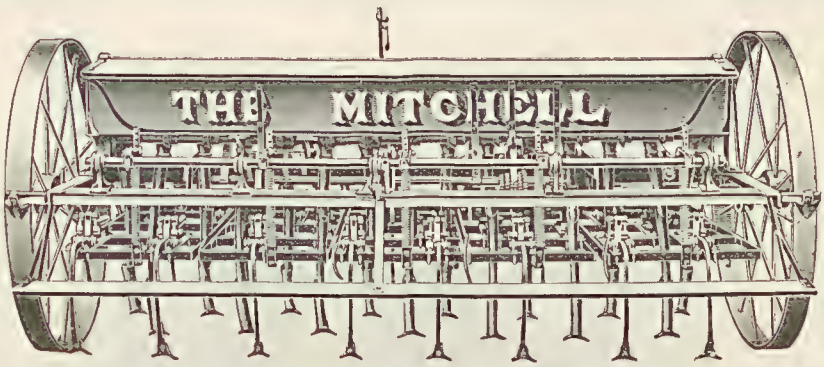

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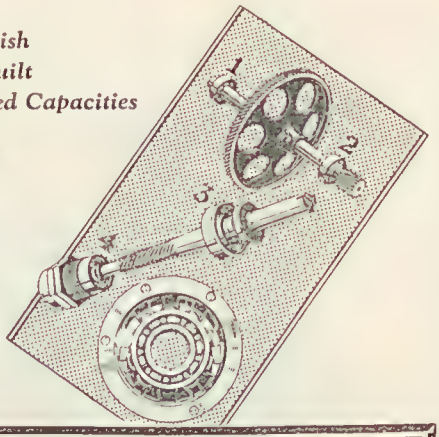

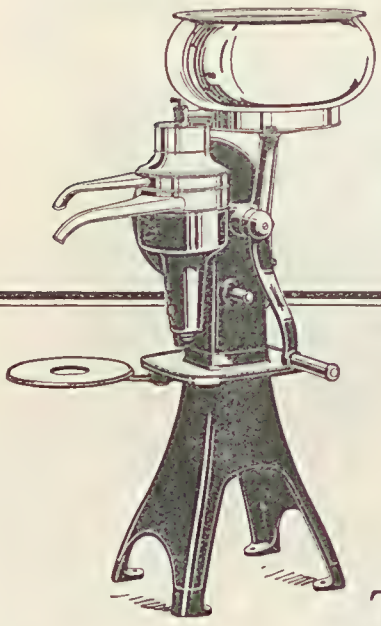

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THE JOURNAL

OF THE

Department of Agriculture

OF

VICTORIA.

Vol. XXVIII. April, 1930. Part 4

THE DEPARTMENT OF AGRICULTURE.

ITS EARLY YEARS AND WORK.

The annual reunion of the staff of the Department of Agriculture was held on the 1st March. In the absence of Dr. S. S. Cameron, Director, who was unable to be present owing to illness, Mr. R. Crowe, Exports Superintendent, presided. The Minister of Agriculture (Hon. W. Slater, M.P.) was present and responded to the toast of "Agriculture."

During the evening the following brief account of the Department and some of its early work was read. These notes were written by Mr. J. H. Mullaly, who retired two years ago after 47 years' service in the Department.

I joined the staff of the Department of Agriculture as a clerk on the 1st September, 1881. At that time, the reins of Government were in the hands of Sir Bryan O'Loughlin, who had allotted the dual office of Minister of Public Works and Agriculture to the Hon. Charles Young, representative for the electorate of Kyneton.

The administrative staff of the Department then consisted of one officer—Mr. A. R. Wallis, who a few years previously had obtained the position of Secretary as the result of his success in a competitive essay on agriculture. I understand that the staff assisting Mr. Wallis prior to my joining the Department had been somewhat larger, but that the "Black Wednesday" dismissals decimated it sadly.

The total sum set aside by Parliament for the service of the Department of Agriculture for the year, exclusive of an amount for vine compensation and grants, was £10,102. From this provision expenses in connexion with the conservation of State Forests and Nurseries, as well as expenses incidental to the Dookie Experimental Farm, had to be met, and the amount remaining for all other departmental activities was only £1,425.

In December, 1881, Mr. David Martin was transferred from the staff of the Lands Department to that of the Department of Agriculture. In February, 1882, a difference of opinion arose between the Minister (Mr. Young) and the Secretary (Mr. Wallis), and both being a bit hot-headed, the brush ended in the latter tendering his resignation, which was accepted. I have always considered the resignation of Mr. Wallis as a distinct loss to Victoria. With the departure of Mr. Wallis, I automatically became the father of the administrative staff although my period of service was less than six months—a rather unique experience. On the resignation of Mr. Wallis, Mr. David Martin was appointed Secretary to the Department and held that position until November, 1901.

During the early years of the Department, one of its principal activities was the eradication of the vine disease (*Phylloxera vastatrix*). Under an Act passed by Parliament, it became obligatory on the part of the owner of every vine growing within a radius of 40 miles of the Geelong Post Office to uproot such vine, compensation being payable therefor. It seemed that at almost every home within the radius there was at least a vine or two—most of them no doubt sturdy if not very fruitful plants trained along verandahs and over sheds. It will readily be understood what a job arose out of the settlement of compensation claims, for it was necessary to safeguard the interests of landlord and tenants, mortgagor and mortgagee, &c.

In a few years, when all the approved compensation claims had been paid, a complaint was made that the payments had been inadequate, and after an agitation lasting some time, the Government yielded, and additional sums were paid. One would have thought the affair must have ended there, but alas! the good old State cow was not yet quite dry, and insistent demands by the vignerons were acceded to, and a third and final payment was made. Altogether, this outbreak of phylloxera at Geelong cost the country a sum of £50,375.

The roll of the Department of Agriculture was considerably augmented in the year 1882-3 by the transfer thereto from the Chief Secretary's Department of the staff of the Diseases in Stock Branch, which consisted of the Chief Inspector, Mr. Edward M. Curr, a very able and conscientious officer, six district inspectors, fourteen inspectors, and one clerk.

Mr. Curr's first appointment to the Government service had been made in 1862, when he was given the post of Inspector of Sheep. Eighteen months later he was made Chief Inspector of Sheep, and in 1873 he became Chief Inspector of Stock. It is interesting to recall that Mr. Curr's father was for many years manager of the Van Dieman's Land Company, and was one of the first persons to bring Hereford cattle and German merinos to Australia.

In the sixties, there was a severe outbreak of scab in sheep, and a sum of £150 was voted by Parliament for a prize for the best essay on the disease, its causes, symptoms, pathology, best means of treatment, and practical hints for its avoidance and extermination. The prize was awarded to Mr. Curr. Within a very little while of the publication of the essay in Australia, it was reprinted in Mexico and the Argentine.

In 1870, a Scab Act was passed. Under this Act, Victoria was divided into a number of districts which from time to time, as circumstances warranted it, were declared clean, until finally, by an Order in Council, dated 6th June, 1876, gazetted 3 days later, the Colony was declared free from scab.

Mr. Curr remained an officer of the Department until the 30th July, 1889, when he resigned owing to ill-health. He died a few days later. Mr. Curr was a versatile writer and his published works include Pure Saddle Horses (1863), Frivolities (1868), Recollections of Squatting in Victoria (1883), and a study of our aboriginals entitled the Australian Race.

The activities of the Department received a great fillip when in 1889-90, the Gillies-Deakin Administration, by special appropriation, made available the sum of £233,000 for the purpose of promoting the dairy, fruit, and wine industries.

In the latter part of 1901, it was decided by the Government to appoint a Director of Agriculture, in addition to a Secretary, the former to have control of the expert staff, while the latter would deal with the administrative staff. Under this arrangement, Mr. Samuel Williamson Wallace was appointed Director, and Mr. E. G. Duffus Secretary. In March, 1909, Mr. Wallace resigned and was succeeded by Dr. Thomas Cherry, who carried on until a few years later he was appointed to the Chair of Agriculture at the Melbourne University. The position of Secretary was held by Mr. Duffus till he reached the retiring age at the end of December, 1911.

At this stage, the Government decided to abolish dual control by doing away with the position of Secretary, so that the administration of the Department should be in the hands of the Director alone, subject of course, to Ministerial control, and Dr. S. S. Cameron was appointed Director, an office he still holds.

MEADOW HAY COMPETITION.

(Conducted by the Central Gippsland Agricultural, Horticultural, and Pastoral Society.)

Report of the Judge, L. C. Bartels, B.Ag.Sc., Senior Irrigation Officer, Department of Agriculture.

The entries in the Central Gippsland Meadow Hay Competition were from a wide area embracing a variety of conditions. The judging which was carried out in December gave one an opportunity of seeing the high productive capacity of the land of the district.

The great majority of the grasses and clovers observed in these Central Gippsland pastures are introduced, and the profusion of their growth suggests their wonderful adaptability to the local conditions. Some of the best pastures have developed without special sowings.

Every seeding of pastures introduces strains of the different species of a fairly wide range. In process of time there is a selection of those strains which are adapted to the conditions. This applies to nearly all the standard grasses and clovers, and one may watch this development over the years in a new pasture.

Millions of seeds are sown per acre, but only a relatively small proportion of the seedlings survive, and a struggle for existence goes on; the complex of conditions made up of soil, topography, climate and management, determines the outcome of the struggle, but eventually, a more or less stable condition is reached in a particular pasture. The dominant types spread, and so districts are characterized by particular types. Thus, in Victoria, as elsewhere, we may find rye grass, both perennial and annual, the various clovers, particularly white, subterranean and strawberry, and even the red, developing naturally. Long ago, this was apparent with the lesser clovers and medicks (often wrongly spoken of as native trefoils), and most farmers know how introductions from overseas have assumed importance in this country; an outstanding example is subterranean clover. Another clover which is asserting itself is strawberry; one looks in vain for any commendation of this species in European literature.

A striking feature of the Central Gippsland meadows is the prevalence of knotted clover which is usually not highly esteemed, but must be considered as a factor in the development of the grass lands of Gippsland. It shows a wonderful response to superphosphate dressings.

Experimental evidence from Werribee shows that the annual clovers, which are winter and spring growers, get the ascendency over white and other summer-growing clovers, if moist soil conditions are not sustained. The rainfall at Moe is about 39 inches. This was slightly exceeded in 1929.

Top-dressing with superphosphate is the most practicable means by which farmers in the Central Gippsland districts can develop their grass lands. On the farms of those competing in the competition under review, the practice has been a general one; a bag per acre is the usual amount applied, but there is a tendency to increase that amount. Heavy manuring by promoting the better elements in a mixture will help to suppress inferior plants and weeds, but a judicious use of the mower is helpful too.

A common weed in the meadows was "Cats ear" (*Hypochaeris radicata*); in one paddock, sorrel and thistles were common, and sticky Bartsia (*Bartsia viscosa*) was growing very thickly through one exhibit at Yarragon.

Only in one case, that of Mr. Battley, was a single-crop meadow presented. He showed a crop of red clover, and it had made fair development. It is suggested that a combination of red clover with Italian rye grass or prairie grass would be preferable to red clover alone, and where potatoes are grown, such a crop would alternate well.

Lucerne is of surpassing value as a hay crop, and it should grow well on well-drained slopes, but not where the sub-soil is waterlogged. Top-dressing and regular cutting will help to keep weeds in check.

Comments on Best Meadows.

The splendid exhibit of Messrs. Mills and Heart, of Thorpdale, which was awarded first prize, was an indication of the fertility of the district. This meadow was three and a half years old, and prior to its seeding in autumn, 1926, the land had been cropped with oats for 23

consecutive years. The seed mixture used in sowing was cocksfoot 10 lb., rye grass 15 lb., subterranean clover 3 lb., white clover 3 lb., per acre. The grassland had received 1 bag of super. annually; in 1929, it was given two bags per acre. The field was grazed until 4th October, and when inspected at the time of judging, cocksfoot was the most conspicuous feature, but some rye grass showed, and there was a particularly dense undergrowth of clovers. Subterranean clover was thick, and red clover fairly common; annual clovers were in abundance. Apart from Brome fescue, the meadow was free from inferior plants and weeds.

Mr. W. Dalgleish's meadow presented this remarkable feature that while it ranked as one of the best inspected, it was a natural growth following on a crop of potatoes six years ago. The composition of the meadow was mainly perennial rye grass with red clover showing throughout, and white clover in patches. There was an undergrowth of annual trefoils and subterranean clover, and knotted clover were common. There was less Yorkshire fog grass, soft Brome, and Brome fescue in this meadow than in most of the other meadows inspected.

The introduction of red clover was attributed to the fact that in winter—when stock are regularly grazed on the area—meadow hay, including red clover, is carted and fed to the cows. The growth is fostered by an annual top-dressing in autumn of 1 bag of super. per acre. This season, as usual, the paddock was shut up at the end of September.

Mr. Adkins's exhibit showed considerable variety in the components of the grass mixture, but it was not uniform. Permanent rye grass was prominent, and cocksfoot well spread. Kentucky blue showed in patches. There was a fair development of white clover, whilst subterranean clover and odd plants of red clover showed up in places. The lesser annual clovers were present in abundance. Plantain was common. The weed "Cats ear" was prominent, and some bracken plants were observed. Soft Brome and Brome fescue were admixed. The growth was fresh and vigorous; Mr. Adkins grazes late into spring to ensure better hay-making conditions when the crop grows. The exhibit in the competition was a meadow which had developed naturally. During the past six years it has been top-dressed with super. each autumn at the rate of a bag per acre.

Details of Awards.

Name of Competitor.	Apparent Yield.	Nutritive Value.	Palatability.	Freedom from Weeds.	Total.
Possible Points	**50**	**25**	**15**	**10**	**100**
Mills and Heart	47	21	13	9	90
Dalgleish, W.	44	23	13	8	88
Adkins, S.	47	19	13	8	87
Roach, W. J.	50	19	12	5	86
Battley, D.	35	22	13	7.5	77.5
O'Brien, M. F.	41	18	12	5	76
Murphy, J. J.	32	21	13	8	74
Goode, R.	27	21	13	8	69

BOORT AND QUAMBATOOK CROP AND FALLOW COMPETITIONS.

Report of the Judge, P. Ryan, B.Ag.Sc., Inspector of Agriculture.

In common with most of the northern wheat districts both Boort and Quambatook experienced a very dry season, which subjected the farming practices of these districts to a very severe test, and rendered the obtaining of high yields almost impossible. In spite of this, the interest in the Boort competition was well maintained, and the number of entries—43—constituted a record for the society. There was a marked falling off in the number of entries in the Quambatook competition, but it is hoped that with a return to normal seasons this competition will again receive the enthusiastic support of district wheat-growers.

It must be admitted that the nature of the season seriously interfered with one of the most valuable aspects of the competition, namely, the opportunity it provides of making a survey of the district crops, and attempting to correlate such factors as methods of cultivation, time of sowing, choice of variety, and rate of manuring with the yields obtained. Not only was the rainfall abnormally light, but it was most erratic in its distribution. As a result there was often a marked difference in the amount of rain received on two farms only a short distance apart. As the season turned out, the receiving of even one isolated thunder shower had an appreciable effect on the yield, and after a survey of the district crops one was brought to the conclusion that the factors which normally have a determining effect on the yield were this season "swamped" by the all-important factor of rainfall. This does not detract in any way from the merit of those who were successful in the competitions, for it was apparent that it was only such as had paid careful attention to the factors mentioned who were in a position to take full advantage of any extra falls that they were fortunate enough to receive.

The soils at Boort and Quambatook may be broadly divided into two main classes—the black and grey clay loams and the red soils, ranging from sandy loam to clay loams. The successful working of these two types present quite distinct problems. The black and grey soils show many points of resemblance to the Wimmera black soils, and the standard Wimmera methods of cultivation can be successfully applied to them. Unlike the red soils, they can be reduced to a fine tilth by frequent cultivations without any danger of their running together and setting. The main difficulty in working them in a dry season is to produce a consolidated seed-bed. In previous reports on these competitions the opinion was expressed that many farmers were cultivating too deeply and producing too deep a mulch. The dry season accentuated these defects, and in cases where the land had been deeply ploughed, even at harvest time the soil was loose, in some instances to the depth of ploughing. As was only to be expected, when the dry spell came these crops quickly suffered from lack of moisture and began to wilt.

It is assumed that many farmers in these districts will sow wheat again on some of this land on which the crops practically failed last year. Where this is being done farmers are advised not to stir the land deeply, but by shallow cultivations produce a mulch of about 2 inches overlying a well consolidated seed-bed.

Except in isolated instances where exceptional rains were received the crops on the heavy black or grey clay loams were not nearly so good as on the red soils, particularly the red sandy loams with a red sub-soil beneath.

In spite of the dry season and low yields there was little evidence of pinched grain. The cool weather which was experienced for some weeks previous to harvest enabling the wheat to fill out and produce a good sample of grain. Deadheads, due to Take-all (*Ophiobolus graminis*) and associated diseases were fairly common, and in two instances at least had seriously reduced the yield. The nature of the season no doubt helped the development of these diseases, but they were also encouraged by the lack of consolidation of the seed-bed. The source of infection is in the soil, and the following methods of control are recommended:—

1. A good stubble burn which will destroy a large number of the spores or seeds of the disease.
2. Early fallowing. This will encourage the germination of the spores of the disease, and in the absence of a host plant on which they can live they will die. To be effective the fallow must be kept free of plants such as barley grass, spear grass, and wallaby grass, which are also subject to the disease.
3. The use of oats as a rotation crop.
4. The avoidance of dry working of the fallow.

Apart from deadheads, the crops generally were free from disease, but in one instance ball smut was present. As this disease can be definitely controlled by pickling, its presence in a crop shows lack of care in the treatment of the seed.

Rance and Free Gallipoli seem to be retaining their popularity as the standard varieties of these districts.

Crops on the Boort Black Soils.

In the heavy land section for the best 50 acres of crop grown on the fallow judged last year there were seven entries. Most of the crops were light and uneven, but the winning crop of Baldmin exhibited by Mr. Moresi, although a little uneven and slightly affected by Take-all, promised to yield well. The cultivations given by Mr. Moresi after the fallow had been judged last year were as follows:—Cultivated with springtooth cultivator and harrowed early in April, harrowed again at the end of April, cultivated early in June, and sown the second week in June with 75 lb. seed and 105 lb. superphosphate per acre. The seed was pickled with copper carbonate.

Mr. Lester Smith was second in this section, and Messrs. M. A. Poxon and Sons third.

In the section for the best aggregate of points received for last year's fallow and the crop grown on it last year, these three competitors also gained first, second, and third places respectively.

Boort Crops—Red Soils.

In the red soil section for the best 50 acres of crop grown on the fallow judged last year there were ten entries, and Mr. J. Crutch gained both first and second places with crops of Free Gallipoli and Ranee respectively. Both these crops were well headed and promised to yield well. They were both sown early in June with 65 lb. of seed and 80 lb. of superphosphate per acre. The seed was pickled with copper carbonate.

Mr. Crutch also won first and second places in the combined crop and fallow aggregate.

Results—Crop and Fallow.

Competitor.	Yield.	Type.	Absence of—		Evenness.	Total Crop.	Total Fallow, 1928.	Grand Total.
			Weeds.	Disease.				
Possible Points ..	**35**	**20**	**15**	**15**	**15**	**100**	**100**	**200**
Heavy Soils.								
A. Moresi ..	30	19	14	12	12	87	91	178
Lester Smith ..	26	18	14	14	12	84	91	175
M. A. Poxon & Son	22	18	14	13	13	80	93	173
J. D. Rosengrave ..	20	18	13	14	12	77	96	173
H. W. Kane ..	19	18	14	13	12	76	92	168
P. H. Toone ..	20	16	14	10	11	71	94	165
J. Greenman ..	19	18	13	13	10	73	91	164
Red Soils.								
J. Crutch, No. 1 ..	27	18	13	14	12	84	90	174
J. Crutch, No. 2 ..	26	17	14	13	13	83	90	173
P. G. Weaver ..	24	17	14	14	12	81	90½	171½
Lanyon Bros. ..	23	18	14	12	12	79	90	169
M. A. Poxon & Son, No. 1	21	18	14	13	11	77	92	169
J. Crutch, No. 3 ..	24	18	14	11	12	79	89	168
G. Frost ..	23	18	14	12	11	78	89	167
M. A. Poxon & Son, No. 2	21	18	14	12	11	76	90	166
F. G. Smith ..	19	18	14	11	12	74	91	165
C. Barton ..	19	19	14	12	11	75	90	165

Fallows.

Considering the small amount of rain that was received from the time that the land was broken, the exhibits in both competitions were generally of a high standard. Quite a number had a high moisture content showing that the farmers concerned had taken full advantage of their limited opportunities to conserve moisture and produce a consolidated seed-bed. In not a few fallows on the heavy black soil where the land had been deeply ploughed the mulch was too deep and the soil loose to the depth of ploughing. It was apparent that unless abnormal summer or early autumn rains were received great difficulty would be experienced in reducing the mulch to the correct depth (about 2 inches) at seeding time. At the time of judging, the most satisfactory fallows

were those originally lightly skin-ploughed, or cultivated with the Wimmera scarifier.

The attention of farmers who are working this type of soil at Boort and Quambatook may be directed to the fact that in 1927 a comprehensive series of cultivation trials was instituted at the Longerenong College. These plots were designed to furnish information as to relative efficiency of the principal systems of fallowing used on the Wimmera black soils, and provide for a comparison, not only of summer and winter fallowing, but also of varying depths of ploughing and mulching. The tests have not been in operation sufficiently long to enable definite conclusions to be drawn, but the results already available indicate definitely the superiority of early fallow over late fallow, and also the superiority of well-worked fallow over a fallow which is simply ploughed in July, scarified in August, and then "sheeped," but not cultivated. There are also indications that summer fallow will give an increased yield of from 2 to 4 bushels per acre over winter fallow.

Farmers in Quambatook and Boort who are working black and grey soils are advised to keep themselves informed of the results from the Longerenong plots, as the conditions at both Boort and Quambatook sufficiently approximate Wimmera conditions to warrant the assumption that the methods giving the best results at Longerenong will be suitable for adoption in the Boort and Quambatook districts.

Results—Black Soil Fallows.

In the fallows on the heavy soil there were fifteen entries, and first place was gained by Mr. H. C. Dunstan, who summer-fallowed his land with the Wimmera scarifier, scarified it again with the same implement in June, cultivated it with the springtooth in July; harrowed it in August, and cultivated it with the springtooth cultivator the first week in August.

Mr. S. Dunstan's entry was placed second in this section. His land was scarified in May, scarified again in August, and cultivated with the combine in October.

Third place was taken by Messrs. Lanyon Brothers' No. 1 entry, which was double-disked in the middle of May, scarified with the Wimmera scarifier early in August, scarified and harrowed in October.

Results—Fallows Red Soils.

There were eleven entries in the section for the best fallow on red soil. Most of the fallows were of a high standard, but a number were unduly rough and showed want of cultivation.

First prize was awarded to Mr. S. Dunstan, whose land was ploughed early in July to a depth of from 2½ to 3 inches, harrowed at the end of July, cultivated with the combine early in October and again at the end of October.

Mr. J. Allen's entry, which gained second prize, was ploughed 3 inches deep with a mouldboard plough in July, disked with the sundercut in August, harrowed twice in September, cultivated with combine with harrows attached in October.

Details of Results—Fallows.

Competitor.	Moisture.	Mulch.	Absence of Weeds.	Cultivation.	Total.
Possible Points	**25**	**25**	**25**	**25**	**100**
Heavy Soils.					
H. G. Dunstan	24	24	23	24	95
S. Dunstan, No. 2	23	23	25	23	94
Lanyon Bros., No. 1	23	23	23	24	93
M. A. Poxon and Son	24	23	23	22	92
S. Dunstan, No. 1	22	22	24	23	91
J. B. Chalmers	21	22	24	24	91
J. Greenman	23	23	23	22	91
Lester Smith	24	22	24	21	91
W. Poxon	20	23	24	23	90
J. Rosengrave	21	22	24	22	89
F. G. Smith	20	22	24	22	88
Lanyon Bros., No. 2	21	22	23	22	88
F. Barton	22	23	22	21	88
T. W. Lanyon	21	22	22	22	87
F. G. Smith	20	21	24	22	87
Red Soils.					
S. Dunstan	24	24	23	24	95
J. Allen	24	24	23	23	94
M. A. Poxon and Son	24	23	23	24	94
F. Poxon	23	24	23	22	92
H. W. Kane, No. 1	23	23	23	22	91
C. R. James	23	22	24	22	91
F. G. Smith	22	23	23	22	90
H. W. Kane, No. 2	22	22	24	22	90
J. Crutch, No. 1	22	22	23	22	89
J. Crutch, No. 2	21	21	24	22	88
J. Crutch No. 3	21	21	24	22	88

Quambatook Results.

Crops.

In the section for the best 50 acres of crop on the heavy soils there was only one entry—that of Mr. A. Schlitz, whose crop consisted of Federation and Nizam.

There were five entries in the section for crops on the red soils, and considering the season they were all of good quality. Mr. J. A. Fawcett was awarded first and second prizes for crops of Yanward and Ranee respectively. The Yanward in particular promised to yield well, and the Ranee while not so heavy was a nice even well-headed crop.

The land on which the Yanward was grown received the following cultivations after the fallows were judged:—It was harrowed in January, 1929, cultivated with springtooth cultivator with light harrows behind in March, 1929, and cultivated with the combine with harrows attached in first week in May. The crop was sown in the third week in June with 67 lb. of seed and 90 lb. of manure per acre. The seed was pickled with copper carbonate powder. The land on which the Ranee was grown was cultivated with the combine with light harrows

attached at the end of March, cultivated with the springtooth with harrows attached at the end of April.

The crop was sown the first week in June with 67 lb. of seed and 90 lb. of manure per acre. The seed was dry pickled.

Fallows.

On the section for fallows on the heavy soils there were only two entries, and Mr. P. E. Hosking was placed first. This land was skim-ploughed in April and again in July, harrowed in July and again in August.

In the section for red soil fallows there were four entries, and Mr. C. H. James gained first place. His fallow was ploughed with the mouldboard plough 3-inch deep early in July, harrowed in August after 35 points of rain, and cultivated in the middle of October after 79 points of rain.

Results Crops and Fallows—Quambatook.

Competitor.	Variety.	Yield.	Type.	Absence of Disease.	Absence of Weeds.	Evenness.	Total Crop.	Total Fallow.	Grand Total Crop and Fallow.
Maximum Points ..	.. ..	35	20	15	15	15	100	100	200
	Heavy Soils.								
A. Schlitz ..	Federation & Nizam ..	18	19	13	14	11	75	91	166
	Red Soils.								
J. A. Fawcett ..	Yanward	32	18	12	13	13	88	95	183
J. A. Fawcett ..	Rance	26	18	14	14	14	86	92	178
P. G. Hosking ..	Free Gallipoli ..	22	18	13	13	13	78	96	174
C. H. James ..	Rance	21	18	14	13	11	77	94	171

Fallows.

Name.	Moisture.	Mulch.	Absence of Weeds.	Cultivation.	Total.
Maximum points	25	25	25	25	100
	Heavy Soils.				
P. G. Hosking	23	22	25	23	93
A. Schlitz	21	23	23	22	89
	Red Soils.				
C. H. James	24	24	24	24	96
J. A. Fawcett	24	24	24	23	95
R. Bennet	23	22	25	22	92
— Wunderlich	22	21	23	22	88

NATHALIA FALLOW AND CROP COMPETITION,

Report of the Judge, W. B. Miller, M.Ag.Sc., Inspector of Agriculture.

Crops grown in the western part of the Goulburn Valley suffered severely from the drought conditions. Although the total rainfall for the year at Nathalia was 1,345 points, only 544 points were registered in the period May to October. On some of the lighter soils, and on the low-lying country towards the river, fair crops were grown, but on the heavier soils there were few crops expected to yield more than 10 bushels per acre. Under such discouraging conditions, it is not surprising that many competitors withdrew their entries from the competition, but it is felt that many opportunities to make interesting, and possibly valuable, observations in a drought year were lost to the judge because of the small number of competitors.

It is to be hoped that the enthusiasm of the Nathalia farmers will be renewed by a good season in 1930, and that interest in the fallow and crop competitions will be maintained.

Flag Smut.

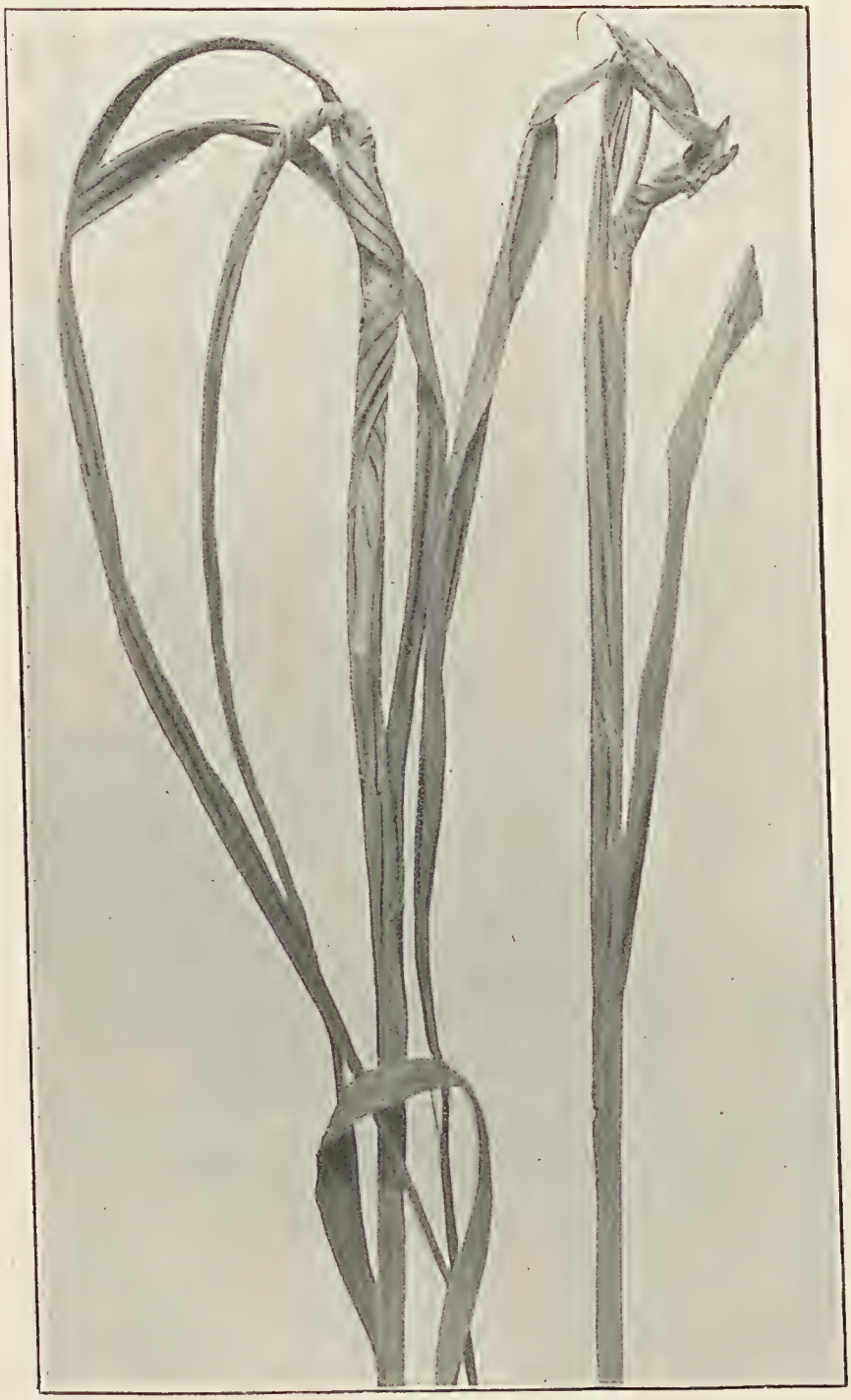
A very noticeable feature of the wheat crops was the loss caused by flag smut (black rust). This disease is caused by a parasitic fungus; there are no grounds for the belief of some farmers who consider that it is brought about by drv weather alone. There may be a greater mortality from flag smut in dry seasons, but in wet years the disease takes a heavy toll also.

On one farm this year, the prospective yield of a thick irrigated crop was reduced by about 40 per cent. when the affected plants failed to produce heads because of the disease. The leaves of a badly affected plant curl, and develop black stripes which later become masses of fine black dust, each particle of which is a seed or spore of the flag smut disease. Before the wheat plant can become infected, a spore of the fungus must germinate in the vicinity of the seedling and then penetrate it. The spores may reach that position in the soil by many means. They may be on the grain itself, or may be brought to the paddock through the agency of animals, diseased fodder, cultivation implements, &c., or, as is most common, by cultivation after the diseased straw falls or is blown on to the ground.

Owing to the widespread nature of this disease, and the importance of its prevention wherever possible, the following means of control are suggested.

1. *Burning the infected stubble.*—If an early and good burn be obtained, a great number of the spores will be destroyed before they can gain protection in the ground.

2. *Thorough and early fallowing.*—This assists in the control of many diseases. Frequent cultivation of the fallow, in addition to increasing the fertility, assists in the rapid germination of the spores, which then die if they have no wheat plants on which to live. Stubble-sown crops tend to multiply diseases. Once the ground is infested with flag smut, it may be years before all the spores germinate, and until they are all germinated a wheat crop sown in the paddock is liable to attack.



Wheat affected with Flag Smut.

3. *Rotation of Crops.*—As wheat is the only plant attacked by flag smut, the growing of other crops in rotation with the wheat crop extends the period during which the fungus may be starved out. Oats for hay, grain, or feeding-off purposes is a suitable crop to sow in paddocks where the previous crop was infected with flag smut.

4. *Delayed or wet sowing.*—When wheat is to be sown in paddocks known to have been previously infected, it is advisable to delay the time of sowing in order that the early rains may cause the spores to germinate and die before the wheat is sown. Should the wheat be sown early whilst the soil is still dry, infection is more likely, for, when the rain does come, the wheat and disease spores will germinate together.

5. *Careful pickling.*—Flag smut may be introduced to a paddock by means of infected seed. Thorough pickling, as used for ball smut, will kill any spores carried on the grain.

6. *The use of oaten hay in preference to wheaten hay.*—Diseased wheaten hay is a menace on a farm, as the live spores may pass through the horse and so be spread over the farm.

7. *Use of resistant-wheat varieties.*—The most popular wheat varieties grown in Victoria are all susceptible to attacks of flag smut. Nabawa, a West Australian variety, now being tried, is reputed to be resistant to this disease, but its prolificacy and suitability under Victorian conditions have yet to be proved.

The Crops.

Generally speaking, the early sown crops germinated and yielded better than did those sown later. The May rainfall was only 40 points, and crops sown after the middle of that month struck very poorly.

The crops of Messrs. N. Harding and J. Flanner were outstanding. The former's crop of Federation, at Barwo, was grown on a paddock of grey loam in which were many crabholes. This land is liable to flooding from the Goulburn and tributaries in a wet winter, but the dry year suited it. The crop was given every opportunity, as it was the first grown in the paddock since 1916; further, the fallow had been well cultivated after ploughing took place in June and July to a depth of 3½ inches. Owing to the omission of cultivation in the dry September, it was necessary to use the smoodger twice in October, and to follow with the spring-tooth cultivator. In November the lumps were rolled out and a mulch re-established by the harrows. The fallow was then left till April, when it was scarified, harrowed, and sown by the end of the month. The quantity of seed per acre was 70 lb., with 90 lb. of superphosphate. The young plants were growing strongly by July, when the paddock was fed off closely and then rolled.

The resulting crop was well headed, free from wild oats and other weeds except for a little Wimmera rye grass which had been growing in the pasture for years before. A trace of ball smut was a blemish; Mr. Harding was fortunate to escape so lightly, as the seed had not been pickled. There was no trace of flag smut, but it is not usually seen on fresh land. Three points were deducted because of foreign heads.

Mr. J. Flanner's crop of Nabawa, at Kaarimba, led in the crop section. Grown on a paddock of grey loam near the Goulburn, it was expected to yield about 3 bushels less than Mr. Harding's crop, but it was true to type, fairly even for the year, and free from all diseases except foot-rot, which caused some dead-heads. After fallowing from grass in 1926, a light crop was grown in 1927, and the paddock again fallowed in July, 1928. The subsequent cultivations were as follows:—Harrowed in August, rolled in September, spring-toothed in October, scarified in May, and then sown with 75 lb. of seed and 90 lb. of manure per acre. In July the crop was rolled and fed off in August.

The remaining competitors showed lighter crops. That of Mr. Bradley, grown at Picola, on light sandy ground, was much heavier than one sown on the heavier clay ground, which gives a comparatively better yield in a wet year. Some of the crops suffered severely from the feeding-off received, and it is very doubtful if such a practice is payable in any but an abnormally wet spring.

Mr. H. Dohnt, who led in the fallow section, obtained a bad strike. In addition, his crop was affected by frost and take-all.

The average amount of seed applied by competitors was 70 lb. per acre, and of manure 85 lb. per acre. The Waaia experimental plots have shown that this dressing could profitably be increased to at least 1 cwt. per acre.

Varieties.

Federation appears to be still the most popular variety in the Nathalia district, but there are still many growers who have not yet tried Free Gallipoli. In the Nurmurkah district this variety has almost completely replaced Federation. The average yields of a three years' trial, at the Waaia experimental plots are as follow:—

Free Gallipoli 19.3 bushels per acre.
Federation 16.7 bushels per acre.

Free Gallipoli does not stool quite so thickly as Federation; therefore, at least 75 lb. of dry pickled seed per acre should be used.

Details of Award.

Best 50 acres fallow 1928 and crop grown thereon in 1929.

Competitor.	Apparent Yield.	Purity and Type.	Freedom from—		Evenness.	Crop Total.	Fallow Total.	Grand Total.
			Weeds.	Disease.				
Maximum Points..	**35**	**20**	**15**	**15**	**15**	**100**	**100**	**200**
N. Harding ..	29	17	15	11	12	84	91	175
J. Flanner ..	26	19	14	13	13	85	89	174
J. J. Bradley, No. 2	24	19	15	12	12	82	87	169
James Thompson	21	19	13	14	13	80	85	165
C. H. Dohnt ..	17	19	13	12	11	72	92	164
J. J. Bradley, No. 1	19	19	13	12	11	74	86	160

NUMURKAH CROP COMPETITION, 1929.

Report of Judge, W. B. Miller, M.Ag.Sc., Inspector of Agriculture.

For some years, crop and fallow competitions have been successfully conducted in the Numurkah district on selected areas of from 50 to 100 acres. In this way, the best fallows, crops and methods could be judged without making the competition too unwieldy.

An innovation was made in 1929, when the competition was for the whole of a farmer's crops, 100 points being allowed for wheat, 25 points for oats, and 25 points for hay (whether wheaten or oaten). It is considered that the original method of competition, that is to say, single crop or single fallow sections, is the better, and it is to be hoped that the Society will revert to it. It results in a greater number of entries, in more attention being paid to details in the preparation of an exhibit, and facilitates the work of judging.

The number of entries, as expected, showed a marked decline, only seven farms being entered. All of these were in the south and eastern part of the district, where, owing to a slightly heavier rainfall and lighter soil conditions, the crops were better able to withstand the dry conditions than those in the heavier country to the west.

The district rainfall for the six months May to November ranged from 5 to 5½ inches. With such a low rainfall, it is remarkable that many farmers obtained a wheat yield of seven bags per acre, while some ten bag crops were reported.

Wheaten Hay.

Hay grown in the northern parts of the Goulburn Valley is usually chaffed on the farm for the horses, or held in reserve for sheep. In the Riverina, wheaten hay is often made, but in Victoria oaten hay is generally regarded as better horse feed. Oats has also advantages as a rotation crop, as it grows well on stubble ground in a normal season, assists greatly in the control of such wheat diseases as flat smut and take-all, and forms a good forage crop for sheep. In some cases, shandy hay is grown, i.e., wheat and oats are sown together, the varieties being chosen so that they are ready for cutting at the same time. When this is done, however, little advantage is gained from the use of the oats as a check to wheat diseases.

In some dry years the oats may not provide sufficient hay, and then it is necessary to cut wheaten hay. As the chaff market is not the objective, the colour of the hay is not very important, but to obtain the best wheaten chaff for use on the farm the wheat should be cut a few days after it flowers. At this stage the plant contains the maximum amount of nutritive qualities. Wheaten hay showing fully developed grain has been cut too late, and for this reason points were deducted in the competition.

When wheat is sown for hay purposes, a tall growing variety with a fairly heavy straw should be chosen. White chaffed varieties, such as Yandilla King, Turvey, and Bald Early, are most popular, and provide good palatable chaff.

Wild Oats.

The wheat crops in the Numurkah district are comparatively free from serious weeds. In some wet years, Cape weed may choke out a portion of the crop, but the only really persistent weed is the wild oat. In some paddocks it is thick, whilst in other paddocks on the same farm it may be partially absent. Although wild oats provide a certain amount of sheep feed, they must still be regarded as doing more harm than good.

In one crop entered for competition this year, the apparent yield was 5 bushels greater in a portion of the paddock where an additional cultivation to kill the germinated wild oats was given a few days before sowing the wheat. In many cases, greater loss was sustained. As the wild oat sheds its seed before the wheat is harvested, it is a most difficult weed to control. Constant cropping, dirty oat crops grown on stubble ground, the use of the modern combine harvester and ungraded seed all tend to increase its spread. Once established in a paddock, wild oats take years to eradicate. Many of the seeds will not germinate until after the cereal crop is sown, and often they lie in the ground for several seasons. In the heavier clay soils of the Goulburn Valley, they may also be protected in the necessarily cloddy mulch.

Methods of Control.

There are two outstanding ways in which the control of wild oats may be attempted.

1. Thorough cultivation with the object of encouraging the wild oat to germinate and be killed before the cereal crop is sown.
2. Rotation of forage crops, principally oats, so that the wild oat, when germinated, is not allowed to seed.

In loamy soils, summer fallowing after a thorough stubble burn in February or March, even if it only consists of a shallow discing or scarifying, will provide sufficient cover to allow the surface wild oats to be germinated by the early rains. Such a cultivation would be done at a comparatively slack time of the year, and the additional sheep feed provided would greatly offset the cost of the cultivation. Where export lambs are produced, an early variety of oats such as Palestine, Sunrise, or Mulga may be sown with the object of supplementing the self-grown green feed until July. For this purpose, the rigid tyne combine is a very useful implement.

It is essential, however, to feed the oats off early, so that the paddock may be thoroughly fallowed by mid-August. If the feed is allowed to get ahead of the sheep, there is a possibility of the wild oats going to seed should fallowing be delayed by wet weather. Where they are expected to be thick, a heavier sowing with wheat, up to 90 lb. per acre will, to some extent, crowd them out.

Late Sowing.

Usually, wild oats are commonest in the early-sown paddocks, for the reason that the late-sown areas generally receive an additional cultivation, and this kills many weeds that germinate after the first portion has been sown.

As a matter of fact, the wheat diseases, flag smut and take-all, may be partially controlled in a similar manner, i.e., by sowing the paddocks which are more likely to be infested with cereal diseases after those which have in the past been comparatively free. Such opportunities to improve his yields should not be forgotten by the wheat farmer when considering the many factors which influence his cropping programme.

It is, however, very important to remember that very late sowing on the heavy loams of the Goulburn Valley is undesirable, and every endeavour should be made to complete all sowing operations by the first week in June.

The Results.

Wheat Section.

Name.	Apparent Yield.	Trueness to Type.	Absence of—		Evenness.	Total.
			Weeds.	Disease.		
Maximum Points	**35**	**20**	**15**	**15**	**15**	**100**
H. Formby	34	19	13	14	13	93
W. White	32	18	13	14	13	90
R. Ritchie	33	18	12	13	13	89
W. H. Hodge	31	18	13	12	14	88
D. A. C. Miller	30	18	13	13	13	87
W. Chessels and Son ..	30	18	13	12	13	86
A. L. Young	29	17	12	12	12	82

With one exception, all the wheat grown by the competitors was on fallowed ground. An outstanding feature of the crops was the well deserved popularity of the Free Gallipoli variety, which is also head of the named varieties tested at the Waaia Experimental Plots. The average amount of seed used per acre was 76 lb., and the dry pickling method of seed treatment was almost general. 87 lb. per acre was the average amount of superphosphate used. Experimental results indicate that this amount could be profitably increased to at least 1 cwt. per acre.

Mr. H. Formby, of Wunghnu, the winner of the competition, showed the heaviest crops of wheat, the varieties being Free Gallipoli, Major, Federation, and Nabawa. All were fairly true to type, showed very little disease, and promised to yield well-filled grain. They had been lightly fed off by sheep during the winter. Mr. Formby's usual method of cultivation is as follows:—Plough to a depth of 4 to 5 inches in June and July, cross-harrow shortly after the plough, and cultivate deeply with either the scarifier or disc early in the spring. If the year be dry, the land may not be cultivated again until after the autumn rains, when either the scarifier or smoodger is used. The crop is usually sown in May with the combine, using 75 to 80 lb. of seed and 90 to 100 lb. of superphosphate per acre.

Mr. W. White of Invergordon had some good clean even crops, but not as heavy as those of the winners. Free Gallipoli, Federation and Nizam were the varieties favoured. The heaviest crop of Free Gallipoli

was grown on a deep red loam fallowed as follows:—Mould-board-ploughed in June to a depth of 4 inches, harrowed in August, scarified in September, and harrowed. At the end of April, sowing took place with the combine; 70 lb. of seed and 93 lb. of superphosphate per acre were used. The crop was partly fed off in July.

The remaining wheat crops were of a high standard, but lost points as shown in the table. Mr. Ritchie, at Katunga East, had some very heavy crop, but lost points because of wild oats and a little disease.

The Hay Crops.

Oats were usually sown for hay, but in many cases they did not recover sufficiently from grazing, and it was necessary to make wheaten hay to provide for the year's requirements.

Highest points in both the hay and oat sections were gained by Mr. A. W. Young, of Invergordon, whose wheaten hay was of particularly good quality. The chief varieties grown for hay were Turvey and Bald Early, both good hay wheats, the latter an early variety. The greater part of the paddock of light red loam on which the wheaten hay was grown had been fallowed and well cultivated. One portion, however, was not ploughed until September, and here the crop was much thinner. His oat-crop sown early on the stubble land promised to yield about 1 ton per acre, but the late-sown crop was very short. Comparisons in this section, however, are of little value, as the crops harvested were almost inversley proportional to the amount of grazing they received. For the same reason, it was most difficult to compare the various oat varieties. Algerian was most popular, but Mortgage Lifter, Sunrise, and Lachlan were also grown.

Hay and Oat Section.

Name.	Hay.			Oats.			Total.
	Quantity per acre.	Quality.	Purity.	Yield per acre.	Type.	Quality.	
Maximum points ..	**10**	**10**	**5**	**10**	**10**	**5**	**50**
A. Young	9	9	5	8	9	4	44
W. White	8	9	4	8	8	4	41
H. Formby ..	8	8	4	8	8	4	40
W. H. Hodge ..	8	9	3	6	8	4	38
D. A. C. Miller ..	5	9	5	7	7	4	37
R. Ritchie ..	10	7	4	5	7	4	37
W. Chessels and Son	7	7	4	7	6	4	35

In the majority of cases, the oats were grown on the wheat stubble of 1928, as is the district practice. Usually, the land is cultivated only once in the autumn, and sown early with 60 lb. of oats and from 50 to 80 lb. of superphosphate per acre.

In some cases, a considerable quantity of barley was noticed growing amongst the oats. From this source, barley may easily get into the wheat crops, and careful growers would be well advised to obtain clean oat seed.

Whole Crop Competition.

Name.	Wheat.		Hay.		Oats.		Grand Total.
	Acres sown.	Points.	Acres sown.	Points.	Acres sown.	Points.	
Maximum Points ..	..	**100**	..	**25**	..	**25**	**150**
H. Formby ..	295	93	35	20	10	20	133
W. White ..	332	90	27	21	26	20	131
W. H. Hodge ..	475	88	37	20	20	18	126
A. L. Young ..	250	82	52	23	60	21	126
R. Ritchie ..	185	89	15	21	35	16	126
D. A. C. Miller ..	250	87	30	19	24	18	124
W. Chessels and Son	158	86	43	18	7	17	121

ULTIMA FALLOW AND CROP COMPETITION, 1929.

Report of the Judge, A. B. Hackwell, B.Ag.Sc., Science Field Officer.

The Ultima Better Farming Association is to be commended for its endeavours to keep the better farming movement active despite the discouraging succession of adverse seasons.

Throughout the district there is a keen desire for agricultural knowledge and an eagerness to improve yields by the adoption of up-to-date methods likely to lead to success.

In the drought year of 1929, a satisfactory total of 39 entries was submitted for the local fallow and crop competitions.

Although the total rainfall for the year in the Ultima township was 998 points, only 447 fell from May to November inclusive, compared with 937 points, the normal registration for this period. The rainfall throughout the district varied considerably from this amount, according to the course of scattered showers, which favored some crops more than others.

Several of the exhibits were very satisfactory, but on the whole the crops were light and uneven according to the type of soil on which they were grown. The season was most unfavorable to crops on heavier land, most of which almost completely failed except for patches in scattered crab-holes. The cool weather late in the season assisted the crops to fill well, and showers in November were of benefit to late crops.

Eleven varieties were used in sowing the crops entered in the Ultima competition last year, and of these Ranee was the most popular, with Free Gallipoli next. In this connexion the results of the wheat variety trials at Swan Hill should be of interest. In 1929, the first year of the tests, the most successful wheats were Free Gallipoli and Sepoy Selection, both of which gave a definite increase in yield of 7 per cent. over the control variety Yandilla King. Rajah, Ranee, 4H, and Federation were all inferior to Yandilla King, Federation being so

to the extent of 39 per cent. In the case of Penny, Nabawa, and Currawa, the results did not indicate any material differences from Yandilla King.

In the competition crops, an average of 60 lb. of seed was sown per acre, and the superphosphate applied varied from 60 to 100 lb. per acre, the average dressing being 83 lb. In this regard, the results of the 1929 manurial trials at Swan Hill are of particular interest in view of the dry season experienced. The heaviest yield was obtained with a dressing of 150 lb. of superphosphate per acre, and the yields were correspondingly lighter with decreasing amounts of manure. Valuing wheat at 4s. 9d. per bushel, and superphosphate on the farm at £5 5s. per ton, the results showed that the most profitable dressing was 150 lb. per acre. This amount gave a net return over no-manure of 14s. 10d. per acre, whereas the net return from the 90 lb. per acre dressings was only 8s. 1d. per acre, a decrease of 6s. 9d. per acre. It is to be emphasized, however, that before definite conclusions can be formed from these tests, additional evidence over the next few years is necessary.

The Cause of "Dead-heads."

Several competitors inquired as to the cause of "dead-heads," which were common to many crops. What are usually known as "dead-heads" in wheat are caused by the attack on the roots and lower portion of the stems of one or more of a group of fungus diseases known as "foot-rots." The commonest form of these "foot-rots" is called take-all (*Ophiobolus graminis*). The fungus may, apparently, attack the crop at varying stages of its growth, and the disease becomes manifest in patches or in single plants scattered throughout. When the plants are affected in the seedling stage, they usually die. Should such plants manage to subsist, or should other plants be affected at a later stage, they will usually appear as dead-heads in the crop.

In some cases, the attack of the disease may be too early or too severe for any grain to be formed in the dead-heads. What usually happens, however, is that the grain is actually formed, but becomes shrivelled and undeveloped, as the roots being diseased and stunted, are unable to absorb sufficient food for the grain to fill out. Dead-heads make their appearance during the "filling" stage of the crop, and are particularly noticeable if hot dry weather sets in at that stage. Seasonal conditions have an influence on the spread of the disease. It is to be expected that in a drought year like 1929 there will be a greater percentage of dead-heads in a crop, for under such dry conditions there is certain to be more plants in a weaker or more susceptible condition than in a normal year. Examination in the field of plants showing dead-heads often reveals a black or pinkish scab-like material near the base of the stem. This is the actual disease, but generally it cannot be detected without the aid of a microscope.

It is sometimes thought that white ants are responsible for dead-heads, but actually the white ants are secondary and usually attack the lower parts of the plants that are already diseased. Frost generally does damage at flowering time when self-fertilization is taking place in the crop. The usual effect is for fertilization in portion of the head

to be interfered with, the result being that in this frosted portion no grains are formed. Examination of a typically frosted head, therefore, may show some grains to be fully developed, and the remainder not to have been formed at all. An extra heavy frost, however, may even prevent any grains from being formed, or may cause the grains that have been formed to become shrivelled, but the roots of a frosted plant should be normally developed, and not diseased and stunted as are those of a plant affected by foot-rot and showing the dead-head condition.

Although the effect on wheats of the various forms of foot-rots are similar to that of the common type called take-all, some differ from the latter in that they will also attack oats. These forms, however, are as yet not known to be responsible for any serious losses in the Victorian wheat belt, as most dead-heads seem to be due to take-all.

The checking of take-all is assisted by a good clean burn of the wheaten stubble, by sowing the wheat on well-prepared early fallow, and by the growing of oats as a rotation. Dry and deep working of the fallow are considered favorable to the development of the disease, and efforts should be made to keep the fallows free from barley grass, as take-off can live on this plant. Flag smut was not so prevelant as in the previous season, and most of the exhibits were free from loose smut. Ball smut, however, was found in four of the fields entered.

The Crop Competition.

The awards in the crop competitions and the aggregate points for fallows 1928 and crops 1929 are as follow:—

CROPS—50 ACRES.—AGGREGATE FOR FALLOWS 1928 AND CROPS 1929. LIGHT LAND SECTION.

Competitor.	Variety.	Apparent Yield.	Purity and Type.	Absence of—		Evenness.	Crop Total, 1929.	Fallow Total, 1928.	Grand Total.
				Weeds.	Disease.				
Maximum points ..	.. .. ..	**35**	**20**	**15**	**15**	**15**	**100**	**100**	**200**
P. Olson (1) ..	Joffre and Ranee ..	23	17	13	12	13	78	93	171
W. H. King (2) ..	Rajah	30	15	14	9	14	82	88	170
A. V. McKenzie ..	Free Gallipoli ..	16	18	13	13	12	72	86	158
W. H. King (1) ..	Free Gallipoli ..	11	18	11	12	12	64	93	157
E. G. Richardson ..	Ranee, Joffre, &c. ..	16	15	13	12	13	69	88	157
C. White	Bald Early	11	18	14	11	12	66	91	157
H. C. Ferrier ..	Bald Early, Ranee, Free Gal., and Yan. King	13	18	14	12	10	67	86	153
N. R. Cole (1) ..	Joffre and Ranee ..	13	17	12	13	11	66	84	150
M. W. McGinness and Sons	Sepoy	10	16	10	11	12	59	89	148
P. Olson (2) ..	Sepoy	10	16	12	11	10	59	86	145
N. R. Cole (2) ..	Ranee	11	18	13	14	12	68	76	144
W. H. Kent ..	(Crop too light for classification.)								

Points for fallow awarded by Mr. R. L. Twentyman in 1928.

The winning entry in this section was a crop of Rajah exhibited by Mr. W. H. King, and which gained 82 points. It was the most even crop inspected in the district, well-grown, and remarkably well-filled, and gave promise of the heaviest yield. Points were lost, however, for the presence of ball smut, as well as of barley and strangers. The seed had been sown on a red sandy-loam rise, about the third week in May with 65 lb. of dry-pickled seed and 90 lb. of superphosphate per acre.

Mr. P. Olson's entry of Joffre and Ranee came second with 78 points. This crop was a considerably later one than the winning entry; it was even, fairly dense, and indicated a good yield. It was sown during the second week of June with about 57 lb. of dry-pickled seed and 90 lb. of superphosphate per acre. Scattered dead-heads, strangers, and a few wild oats were present.

In the aggregate for the fallow 1928 and crop 1929, Mr. P. Olson's number 1 entry obtained 171 points, Mr. W. H. King's number 2 entry 170 points; Mr. A. V. McKenzie next with 158 points.

Crops—50 Acres.—Aggregate for Fallows 1928 and Crops 1929.

Heavy Land Section.

Competitor.	Variety.	Apparent Yield.	Purity and Type.	Absence of—		Evenness.	Crop Total, 1929.	Fallow Total, 1928.	Grand Total.
				Weeds.	Disease.				
Maximum points ..	.. .. ..	**35**	**20**	**15**	**15**	**15**	**100**	**100**	**200**
D. McKenzie ..	Nabawa	25	18	14	13	11	81	85	166
G. Bailey ..	Ranee	23	17	14	13	12	79	85	164
G. Marks ..	Free Gallipoli ..	14	17	11	14	10	66	91	157
J. L. Thomas ..	Free Gallipoli and Penny	13	14	12	14	11	64	88	152
T. O'Brien ..	Ranee	11	18	13	13	12	67	81	148
W. A. Pedley ..	Ranee and Joffre ..	13	17	11	11	10	62	76	138
D. A. Baird H. M. Hamilton H. F. Kelly	(Crops too light for classification.)								

Points for fallow awarded by Mr. R. L. Twentyman in 1928.

Mr. D. McKenzie's crop of Nabawa gained first place in this section with 81 points. This crop was well advanced, and at the time of judging the grains were large and well-filled, and a heavy yield was expected. The area, however, contained some light patches, and the greater part of the crop had tipped. It had been sown with 60 lb. of dry-pickled seed, and 90 lb. of superphosphate per acre at the end of April, the earliest of any crop in the competition.

Mr. G. Bailey's crop of Ranee also gave promise of a relatively good yield, and was a close second with 79 points. It had been sown with 55 lb. of seed pickled with formalin and 80 lb. of superphosphate per acre, at the end of May.

In the aggregate in this section for fallow 1928 and crop 1929, Mr. D. McKenzie's entry gained 166 points, Mr. G. Bailey's 164 points, and Mr. G. Marks's 157 points.

The Fallows.

Farmers throughout the district are generally appreciative of the importance of good fallowing in successful crop production. Efforts in the preparation of a fallow are unfortunately restricted in a dry year like 1929 with few opportunities presented for cultivation. These difficulties are accentuated by the breaking down of the heavier types of soil. With the varying rainfall in the district and the varying types of soil, the wide difference seen in the standard of the fallows presented for judging was to be expected. Several of the exhibits were of good quality considering the conditions experienced.

The division of the competition into two sections, one for light land and one for heavy land, enabled the fallows to compete under more even terms. As the soils of the district varied gradually from moderately light-sandy types to decidedly heavy black or red crab-holey flats, there were some entries on the border line, and might have been placed in either section. With the majority of the fallows, however, there was no question as to the classification.

The awards for 1929 are as follow:—

Fallows.

50 Acres. Light Land Section.

Competitor.	Moisture.	Mulch.	Absence of Weeds.	Cultivation.	Total.
Maximum Points ..	25	25	25	25	100
H. C. Ferrier	22	23	23	22	90
P. Olson (1)	24	21	24	20	89
G. Bailey	20	20	24	19	83
P. Olson (2)	23	19	22	19	83
A. V. McKenzie	20	21	23	18	82
W. H. Kent	23	19	19	18	79
M. W. McGinness and Sons	17	20	20	18	75
W. H. King	18	20	20	16	74

Mr. H. C. Ferrier's entry of a sandy-loam rise obtained first place with 90 points. It showed thorough workmanship with a good even depth of mulch over a level bed. The land had been summer-fallowed in February with a skim plough, scarified in April, cross-scarified in August, and except for about 9 acres on the top of the rise was lightly skim-ploughed in October after 35 points of rain.

Mr. P. Olson's number 1 entry of even red sandy loam came a close second with 89 points. It showed a splendid moisture content, but the mulch, of uneven depth, was very shallow in places and the seed-bed ridged. The area had been spring-toothed late in June, and a portion similarly worked again in September.

FALLOWS.

50 ACRES. HEAVY LAND SECTION.

Competitor.	Moisture.	Mulch.	Absence of Weeds.	Cultivation	Total.
Maximum points	**25**	**25**	**25**	**25**	**100**
T. W. Atkin (1)	19	23	23	24	89
C. White	20	22	21	24	87
T. W. Atkin (2)	18	21	20	24	83
T. O'Brien	18	22	20	22	82
J. L. Thomas	20	21	19	22	82
D. McKenzie	22	21	18	20	81
G. Bailey	18	19	18	23	78
H. L. Sayers	17	19	17	24	77
T. S. Fleming	19	18	16	20	73
W. A. Pedley	18	18	16	21	73

Field Day—Swan Hill Experimental Plots, 1929.

Conducted by Mr. J. Brake, Senior Inspector of Agriculture.

These plots, established in 1929, should form a reliable guide to wheat-growers in the Swan Hill and Ultima districts.

A splendid job had been made of the early preparation of Mr. T W. Atkin's number 1 fallow on a heavy red flat. The moisture content was low, but the entry obtained first place with 89 points. The area had been worked up with a mould-board plough late in April, harrowed in May, and cultivated with a combine in mid-June.

Mr. C. White also exhibited a creditable fallow that consisted mainly of strong red ground. It was placed in the heavy land section, in which it gained second place with 87 points. The paddock had been skim-ploughed in March, and again in September, and spring-toothed in October.

A ROMSEY DAIRY FARM.

By Alex. Mess, Dairy Supervisor.

In 1922, Mr. N. B. Alston left the Alston Estate at Cobram and purchased a farm in the Romsey district, about 3 miles from the Romsey railway station. This property has an area of 130 acres of rich, dark chocolate soil, and until the present owner took possession, it had, for nearly 80 years, been used mainly for potato growing.

Mr. Alston had been accustomed to dairying in the Cobram district, and was convinced that it would be a better proposition than potato growing. It was his wish to get together a herd of pure-bred Jerseys, but in this project he received no encouragement from his fellow-dairymen at Romsey; rather were they scoffers. It was not this, however, that deterred Mr. Alston from procuring a Jersey herd, but other reasons, and he resolved to begin with cows of the average sale-yard type obtained at clearing sales.

The Influence of High-producing Animals.

It is very interesting to note the results of his dairying operations from year to year. At the end of the first year, the returns from the local butter factory for cream from the 23 milking cows amounted to £139 4s. 10½d., or an average of £6 1s. 1½d. per cow. This result was so unsatisfactory that it was decided to test the herd and cull the "duffers," and though in the following season the herd numbered only fourteen, the total return from the factory increased to £170 19s. 6d., an average of £12 4s. 3d. per cow. By the third year the pastures had been improved, and fodder crops, including oaten hay, maize and millet, were grown. Further culling of the herd took place, and three pure-bred Jerseys were purchased, viz., "Jessie's Dream of Esperanza," "Trinket of Esperanza," and "Tulip 4th of Bonshaw." Unfortunately, Trinket died during the year. This year, only ten cows were milked, and, at the end of the season, the total return was £137 12s. 6d., an average of £13 15s. 3d. per cow.

By this time, Mr. Alston realized that the keeping of cows of low yield was a great mistake, not only because they were taking the place of more profitable animals, but because the progeny of such cows were not likely to become profitable producers. It was therefore decided to sell all the cows on the farm except the pure-breds, and to build up a herd of pure-breds only.

During the 1927-28 season, a pure-bred herd of ten was milked, and there was a remarkable improvement in the factory returns. The total for the season was £244 5s. 2d., an average of £24 8s. 6d. All the returns quoted are authentic, and can be verified by the Manager of the Romsey Butter Factory.

It is certainly worthy of mention that the feed of both the scrub- and the pure-breds were similar. Apart from grass, it consisted mainly of crushed oats, bran, and oaten chaff.

The return for the present year for the sale of cream alone from the twelve cows amounts to £337 14s., an average of £28 2s. 10d. per

cow. The value of the skim milk, and of the milk, cream and butter used for household purposes is not included in this return, but would augment the amount considerably.

"Tulip the 4th of Bonshaw" has been a very profitable cow for the owner, and, since her purchase, she has had several female calves. "Lord II of Brucevale," bred by Captain Percy Chirnside, is at the head of the herd at the present time. His sire is "Kewpie of Warenda" from "Meadow Sweet of Warenda," which cow, while under five years of age, had to her credit successive records of 494 lb., 439 lb., and 484 lb. of butter-fat. These records were made while "Meadow Sweet" was in the Government Standard Herd Test.

"Aveley Antony," a young bull purchased at Aveley Stud Farm dispersal sale, is coming on for future use, and is a very promising looking animal. He is out of "Grevillia of Springhurst," a cow whose lactations over 6 years average 428 lb. butter-fat.

Rosyth Tulip, Senior 3-year-old.

(Completed test during year ended 30.6.29.)
Butter-fat, 440·27 lb. Milk on last day of test, 30 lb.

A study of these figures shows the influence that high producing pure-bred animals have in raising the returns from an unprofitable amount to a very satisfactory return, and so lowering the cost of production.

Although selective breeding is the means one must use in obtaining a profitable dairy herd, it is commercially effective only when combined with feeding, and, of course, culling, which it presupposes—"Breed, feed, and weed."

All stock feed required, except bran, is grown on the farm. Oats are threshed and crushed there so as to eliminate waste.

Mr. Alston has devoted some 20 acres to potato-growing during the past seven years. He has, for some time, been sub-dividing the property into smaller paddocks and sowing them down with grasses

and clovers, and top-dressing all the pastures. At present, the farm is divided into nine paddocks, and two of eight acres each have just been sown down with rye grass and clovers. Mr. Alston maintains that growing more and better feed for the cows gives a better return than growing potatoes for market. He is a great believer in top-dressing, and thinks that by this practice, two or even three blades of grass can be made to grow where only one grew before. In this way, the stock carrying capacity of the land can be increased, and at the same time, the cost of production reduced.

The Value of Testing.

Daily records have been kept on the farm for some time, and all the family are keenly interested in them, and in the results obtained by their herd in the Government Standard Herd Test. The boys take a great delight in weighing each cow's milk, recording the weights, and in bailing up and feeding the cows.

Daily recording of the weight of each cow's milk is very desirable on any dairy farm, and often leads to detection of ailments in the herd

Part of Mr. Alston's Herd.

earlier than would be the case otherwise. A great advantage of weighing the milk of each cow is that her yield is a guide as to what quantity of feed should be allotted to her.

Stock from herds culled on test invariably fetch higher prices at sales than do animals from untested herds. Breeders and others having pure-bred cattle to sell know the value of records, and are always keen to quote any Government Standard Herd Test results of any relations that are available, no matter how remote in the line of pedigree these relatives may be, or how long since their day.

Testing each individual cow, either in local testing associations or in the Government Standard Herd Test, is just as important as it is for a butter factory manager to test each individual can of cream he receives at his factory. What would the farmer say if a factory manager pooled all the cream received, and paid suppliers on a *pro rata* basis!

To infuse more interest throughout the district in pure-bred cows, Mr. Alston offered several dairy-farmers pure-bred bull calves in exchange for their scrub bulls, but only two men availed themselves of the opportunity of thus securing a pure-bred sire from a high-producing dam. In most cases, the neglect was due to sheer apathy. One man, however, evidently had a proper appreciation of the value of such a bull, because he thought the offer was too good to be true; he declared, in the slang of the day, "that there must be a catch in it."

When Mr. Alston took over the farm it lacked a good water supply. Knowing how necessary ample drinking water is for stock, it was decided to put down a bore, and last summer, a good flow was reached at a depth of 185 feet. Now a good, permanent supply of clean drinking water is assured. The cost of boring and casing was 19s. per foot.

Mr. Alston has begun to raise pure-bred pigs. Recently he purchased two pure-bred Large York sows—one from Mr. Wallace, of Bendigo; the other, "Jerseyholm Beauty 13th," from Mr. Crabtree, of Trafalgar.

Mr. Alston's boys ready for School.

Mr. Alston always has available for his cattle a lick, recommended by the Department of Agriculture, and consisting of—

Salt	60 lb.
Bone flour	30 „
Sulphur	5 „
Sulphate of iron	3 „
Magnesium sulphate	2 „
Potassium iodide	3 oz.

These ingredients can be bought separately, and mixed by dissolving the potassium iodide in a cupful of water, and sprinkling it on the salt; the salt is then added to the other materials. The whole of the ingredients should be passed through a sieve to ensure thorough mixing. The mixture should be stored in boxes, and these should be put in places protected from the weather, but easy of access to stock.

POULTRY DISEASES.

By H. E. Albiston, D.V.Sc., Acting Director, Veterinary Research Institute, Victoria.

This is the first of a series of short articles on the more important diseases of poultry, prepared at the request of the Chief Veterinary Inspector of the Department of Agriculture, Victoria. These articles are not intended to be complete scientific accounts from the pathological and bacteriological standpoints. They have been written with the view that every poultry-farmer should possess some knowledge of the various contagious diseases which may attack his birds, and of the principles underlying their control and eradication.

The author makes no claim to originality in this work, although the experiences of the Veterinary Research Institute of the Melbourne University on the subject of Poultry Diseases have been drawn on wherever it has been thought advisable.

Poultry-farmers experiencing losses among their stock are urged to seek the advice of the Chief Poultry Expert, or to communicate with the Director, Veterinary Research Institute, University of Melbourne.

I.—BACILLARY WHITE DIARRHOEA OR PULLORUM DISEASE.

Bacillary White Diarrhoea, or Pullorum disease, is the most serious of all the contagious diseases of poultry. It is said to be responsible for the loss of 10 per cent. of all chicks hatched in the United States of America. It has been present in Victoria for a number of years, and is becoming more common as the poultry industry develops.

Pullorum disease is a specific infectious disease of birds, caused by a micro-organism or germ, the *bacterium pullorum*. This germ was discovered as the cause of the disease by Rettger and Harvey in the United States of America in 1908; it is a slender rod-shaped form, allied to those bacteria known as the paratyphoid group, and can be found in large numbers in the blood and organs of chickens dying from the infection.

In young chickens, the disease occurs as a septicaemia, which runs an acute course, and is usually accompanied with a high mortality rate. It is not confined to chickens, however; adult birds may be infected, although in them the disease generally assumes a chronic and rarely fatal form.

Owing to the fact that white diarrhoea, though frequently present, is not a constant sign of infection in chickens, and that adult birds with the chronic form of the disease do not show any diarrhoea, the name Bacillary White Diarrhoea is being superseded by the term Pullorum disease to describe the condition.

Susceptibility to Infection.

While the domestic fowl is probably the commonest victim to Pullorum disease, it is of interest to note that turkeys, sparrows, and certain cage birds have been proved susceptible to infection. The liability of sparrows to contract the disease assumes some importance in the consideration of the control of infection.

Source of the Infection.

Infection of chickens may occur in several ways, but most frequently through the medium of infected eggs. One of the most interesting and important characteristics of the disease is that when chickens suffer from an acute attack, and, owing to an exceptionally strong constitution, survive, in a large percentage of cases they will retain the infection for long periods, and become "carriers" of the disease. In hen birds, the infection usually persists in the ovarian system, and as a result a number of the eggs laid by carriers are found to contain the germ causing the disease. Many of these infected eggs prove on subsequent incubation to be infertile; in other cases, however, where the infected egg is fertile, the chicken hatching from it emerges infected with the disease. In addition, numbers of the germs which adhere to the down covering the body when it is moist become pulverized and contaminate the air and interior of the incubator as the chicken dries. The immediate result is that the other chickens in the incubator are exposed to infection, which is present not only in the droppings of the infected chicken but also in the atmosphere and on the floor of the cabinet in which they were hatched. Accordingly, shortly after hatching, Pullorum disease makes its appearance. Infected chickens pass large numbers of the germ in their droppings, and as the disease can be contracted by eating food contaminated with the germ, it may readily be seen how liable the disease is to spread rapidly through chickens in the same brooder. Again, contaminated droppings carried from one brooder to another on the boots of poultry-attendants may result in the epidemic spreading from one infected batch right through a hatching establishment. A less frequent means of spread, but one which should be borne in mind, is through the medium of wild birds such as sparrows, which if allowed access to poultry houses may carry the infection from one part to another.

It has been mentioned that eggs from carrier hens frequently prove infertile. These eggs often contain the germs causing the trouble, and the practice of feeding infertile eggs from an incubator to poultry has been proved the source of outbreaks of Pullorum disease.

As far as is known, the cock bird plays no part as a carrier of the disease.

Acute Pullorum Disease in Chickens.

Symptoms.

The disease may show itself in a very short time after hatching. Deaths usually begin to occur on the third or fourth day, and continue until the third or fourth week after hatching. The rate of mortality averages about 75 per cent., although in small flocks every chicken may be lost.

The actual symptoms shown can hardly be called characteristic. The chickens usually huddle together, with drooping wings, and show little or no appetite. Some of the chickens may show signs of diarrhoea with the passage of whitish pasty material which often adheres to the down around the vent, blocking the opening. In acute cases death occurs very soon after the appearance of sickness. In the more chronic cases, the bird is dull, not interested in its surroundings, may show lameness, and the abdomen is prominent behind. Chicks recovering from the infection remain stunted and show unthriftiness for some time.

Post-mortem Appearances.

In the most acute cases, the bird dies so soon that visible signs of disease are not present. In a large number of cases examined, however, the appearance of the internal organs are usually characteristic. The liver is enlarged, congested, and frequently shows yellowish spots throughout its substance. Pneumonia may be present with grey or yellowish nodules in the lungs, and similar nodules are often found in the heart muscle and in the musculature of the gizzard.

It was thought for some time that an unabsorbed yolk sac was a reliable indication of infection with Pullorum disease, but observations on a large series of chickens at the Veterinary Research Institute have shown that the absorption of the yolk sac may be delayed for long periods in various abnormal conditions of chickens.

Diagnosis.

The proof of infection rests with the recovery from sick or dead chicks of the specific germ causing the infection. The germ can be recovered readily from the blood and organs of an affected bird. The presence of Pullorum disease should be suspected when chickens commence to die in large numbers shortly after hatching, especially if there is no obvious defect of the incubator, or management of the birds. In such cases, no time should be lost in seeking expert advice, as an early definite diagnosis may be the means of avoiding much preventable loss.

Treatment.

All efforts to cure affected chickens are useless, and should not be attempted. Once the disease is established and the diagnosis confirmed, every step should be taken to prevent its spread to healthy chickens. All diseased chickens should be destroyed and the carcasses burnt along with the carcasses of birds dying from the disease. Apparently healthy chickens in contact with diseased birds should be considered potentially infected, and placed in strict isolation. Owing to the fact that the carriers of Pullorum disease are birds which have contracted the disease while chickens, and have survived the infection, recovered chickens and contacts *should never be used for breeding purposes.*

The ideal procedure would be to destroy every individual of a batch of chickens among which Pullorum disease had occurred. As this would entail an economic loss which in many instances could be borne only with great hardship, it is frequently necessary to devise some means whereby surviving chickens may be reared and fattened for table purposes, and yet prevented from serving as a focus of infection for the breeding stock or newly hatched chickens. The type of scheme to be elaborated depends on the class of farm concerned, and interested poultry-keepers should seek expert advice before adopting such a plan. Incubators, brooders, and runs in which diseased birds have been kept, should be thoroughly disinfected. Probably the best disinfectant for the interior of incubators and small brooders is a 5 per cent. solution of formalin in water. Where practicable, the top layer of soil of contaminated runs should be removed to a depth of several inches, mixed with lime and buried; and the run re-surfaced with clean soil. Failing this, the run should be treated with ground quicklime, and birds kept from it for at least four weeks. All droppings should be collected and burnt.

Pullorum Disease in Adult Birds.

Occasional outbreaks of acute disease of adult birds, due to infection with *B. pullorum* have been described, but they are the exception rather than the rule.

Pullorum disease in the grown fowl is usually of a chronic type, manifesting no symptoms during life. As mentioned previously, when female chicks survive infection, the causal germ usually locates in the ovary, and when the bird becomes fully grown, the infection is found to persist in this part of the body. Although infected birds continue to lay, the number of eggs is diminished, especially towards the end of the laying season. It should be remembered, however, that, judged on external appearances, hens infected with chronic Pullorum disease usually seem quite healthy.

Post-mortem examination reveals the effect of the disease on the ovary. The diseased ova are angular and hard, smaller than normal, and usually show a reddish-yellow or greenish colour. On being cut with a knife, they are found to be quite firm, and of a cheesy consistency. Sometimes infected ova show as cysts containing a dark fluid. Bacteriological examination of these diseased ova shows that they contain the causal germ.

Bearing in mind that the carriers of Pullorum disease appear in sound health, it is obvious that some method whereby infected hens may be detected and so eliminated from the breeding stock would be of immense value.

It has been found that the blood serum of an infected fowl possesses the power of causing the clumping or agglutination of the germs (*B. pullorum*) where a suspension of the germs in saline is mixed with the serum in certain proportions. This test, known as the agglutination test, has been applied to many thousands of blood samples at the Veterinary Research Institute during the past few years, with the result that a number of poultry-farmers have been able to eliminate infected hens from their breeding stock, and consequently to reduce their chicken mortality to a minimum. It is no exaggeration to say that several poultry-men would have been forced to relinquish their business but for the use of this test.

The blood samples for the test are taken by making an incision with a sharp clean knife or scalpel in the wing vein at the point where it passes over the elbow joint. A small incision made in the direction of the length of the vein, rather than across it, is preferable. The blood is allowed to flow into small, clean, dry tubes, which may be obtained from the Institute. Immediately the samples are taken, they should be corked, and forwarded at once to the laboratory by the most direct route. If practicable, it is advisable, when undertaking the collection of blood samples for the first time, to seek the assistance and advise of the Poultry Department.

Control of Pullorum Disease.

The control of Pullorum disease, as with every contagious disease, can be assured only by the definite co-operation between those engaged in the industry and the Government Department which administers the Stock Diseases Act.

An important step, and one which would have a marked effect, would be the certification of flocks proved free from Pullorum disease. Poultry-breeders should be given the opportunity of having their breeding stock tested under departmental auspices, and those flocks proved free from the disease should be "accredited" by the Department. Of course, certain fundamental principles would need to be observed with regard to the introduction of fresh stock to an accredited flock. The conditions governing the establishment and maintenance of an accredited flock would be determined by the Department.

In this way, purchasers of eggs for hatching, or of day-old chickens, by dealing with accredited farms, would be safeguarded, as the possession of a Government certificate by a poultry-farmer would imply a freedom of his stock from Pullorum disease.

Summary.

1. Pullorum disease is a contagious disease of poultry, caused by a micro-organism or germ, the *Bacterium pullorum.*

2. The disease is usually accompanied by a high mortality. Recovered female chickens frequently retain the infection in their ovaries, and become "carriers."

3. The acute form among young chickens generally starts in the incubator through the hatching of infected eggs laid by a carrier hen.

4. Deaths occurring among newly-hatched chickens, with an increase in the rate of mortality from the fourth to the tenth day, should arouse the suspicion of the owner. In such cases, a definite diagnosis should be sought. For this purpose, preferably live chickens should be submitted to a laboratory for examination.

5. When a diagnosis of Pullorum disease has been confirmed, all sick chickens should be destroyed, and all carcasses burnt.

6. Chickens in contact with diseased birds should be isolated immediately, and if reared, they should never be used for breeding.

7. Chicken houses, incubators, brooders, &c., in which the disease has occurred should be thoroughly and efficiently disinfected before being used again.

8. In flocks where the disease has occurred, the breeding stock should be tested, and the reactors to the test eliminated before the next breeding season. Eggs from non-reacting hens only should be used for hatching. All reactors should be isolated, and used for table purposes.

9. The disease is very contagious. The germs causing the disease are present in large numbers on the bodies of diseased chickens, in the droppings, and in the litter of incubators, brooder-houses, &c. Extreme care should therefore be taken to thoroughly wash and disinfect the hands, boots, overalls, &c., after handling infected material.

At the Veterinary Research Institute, it has been found possible to examine a limited number of blood samples each year for the presence of Pullorum disease. It is hoped that this service will be available during the current year, but poultry-keepers are reminded that, under the existing conditions at the Institute, the number of tests which can be dealt with is strictly limited.

A charge of £1 10s. for each 100 tests is made. The collecting tubes will be supplied by the laboratory on application. Poultry-keepers who desire to have birds tested should communicate with the Director, Veterinary Research Institute, Story-street, Parkville.

THE PROGRESS OF HERD TESTING.

By W. J. Yuill, Senior Dairy Supervisor.

(Continued from page 123.)

Fewer Cows but More Butter-fat.

During the 1923 season, the original eight Herd Testing Associations in South Gippsland tested 6,744 cows; their average production was 179 lb. of butter-fat—a total of 1,210,590 lb. In 1928-9, the average of these Associations had risen to 268.4 lb. per cow, and 5,410 cows produced 1,457,368 lb. To have yielded this amount of butter-fat in 1923, 8,142 cows would have been needed. The herds in the comparison were not identical, but the Association areas were the same. 1,334 less cows produced 246,778 lb. or 110 tons more butter-fat, and this at 1s. 6d. a lb. represents a sum of £18,508. If the value of the extra skim milk be expressed in lb. of pork at 6d. a lb., a further sum of £8,115 would be added.

On page 232, the average percentage of butter-fat in Gippsland milk is shown to be 4.4; 268.4 lb. of butter-fat would be produced from 610 gallons of this milk; from 405 gallons, the resultant butter-fat would be only 178 lb. Further, from the increased quantity of skim milk, an additional 60 lb. of pork could be raised, which would mean a further yield of 30s. per cow.

No doubt some of the increased production was in some measure due to seasonal influence, but that it was mainly due to beneficial results from herd testing is shown by the much lower herd averages of the more recently-formed Associations in the same areas.

This fact is best illustrated by a comparison of the famous Nalangil area and Yinnar. Nalangil produced 51,804 lb. less butter-fat than Yinnar, although at Nalangil there were 224 more cows tested. And again, at Dreeite South, where 59,620 lb. less butter-fat was produced than at Myrtleford, although there were 39 more cows in the Dreeite South Association. At Mortlake, 580 cows yielded 92,510 lb., but at Swan Hill, 597 cows gave 165,150 lb.; there were only 17 more cows milked at Swan Hill, but there was a difference of 72,620 lb. butter-fat. This result was brought about by herd testing, although, of course, Swan Hill has the advantage of being an irrigation area.

Both Casterton and Boolarra are hill country associations. At Boolarra, herd testing has been in operation for seven years; at Casterton, for only one year. The worth of testing is reflected in the following figures:—

At Boolarra, 458 cows produced 128,698 lb. butter-fat.
At Casterton, 441 „ „ 73,647 „ „

Council of the Victorian United Cow Testing Association.

STANDING (left to right): Mr. C. C. Johnstone, North-East Area; Mr. J. Campbell, Irrigation Area; Mr. M. M. Foster, Western Area; Mr. P. Pentland, Main Gippsland Area; Mr. L. Monod, Royal Agricultural Society (Secretary); Mr. J. Howie, Western Area.
SITTING (left to right): Mr. A. Moore, South Gippsland Area; Mr. R. Goodman, Main Gippsland Area; Mr. H. Shiers, Irrigation Area (President); Mr. D. Waddelton, South Gippsland Area; Mr. W. J. Yuill, Department of Agriculture (Treasurer). (Dr. J. L. Henderson, North-East Area, is absent.)

Five of the original Associations have improved their average returns by more than 100 lb. butter-fat per cow. Others have an increase of over 50 lb. Rochester and Leitchville are both irrigation areas. In the former area, 417 cows produced 112,590 lb. butter-fat, while at Leitchville, 603 cows yielded only 106,128 lb. This simply means that Rochester has a four years lead of better dairying methods.

Maffra No. 1, and Warrnambool No. 1 were the two highest producing units. At Maffra, 984 cows produced 40,177 lb. more butter-fat than did 1,210 cows at Warrnambool. In view of this, it is interesting to note that 40 per cent. of the cows tested in the Maffra Association are juniors, while the juniors in the Warrnambool Association make up only 8 per cent. High-producing junior cows are most common in those areas where sons of high-producing pure-bred cows have been used.

Table Showing the Distribution of High-producing Junior Cows.

District.	3-year-old.		Senior 2-year-old.		Junior 2-year-old.	
	400 lb.	300 lb.	400 lb.	300 lb.	400 lb.	300 lb.
Gippsland	38	375	9	155	6	106
Western	1	87	..	27	..	17
Goulburn Valley	30	178	2	71	3	73
North East	..	20	1	24	..	6

Comparisons are said to be odious, but it is well to remember, however, that they may also be educational.

What has been done in the early Associations will surely be done in those recently formed, provided that similar methods are employed.

In the South-Western area, the Sisters Association has shown an improvement of 82.2 lb. per cow, Paschendale 57 lb., and Noorat 41 lb. At Myrtleford, in the North-East area, the average has increased by 82.3 lb., at Tallangatta by 55.3 lb., at Kiewa by 33 lb., at Alexandra by 54.3 lb., and at Eskdale by 33 lb.

In the Goulburn Valley irrigation areas, Tongala has shown the greatest improvement. At Rochester, the average production of the cows in the original herds tested is now 295 lb. New units cause a re-arrangement of boundaries, and a drafting of new members into the original units, which affect the Association's average.

Some Outstanding Herds.

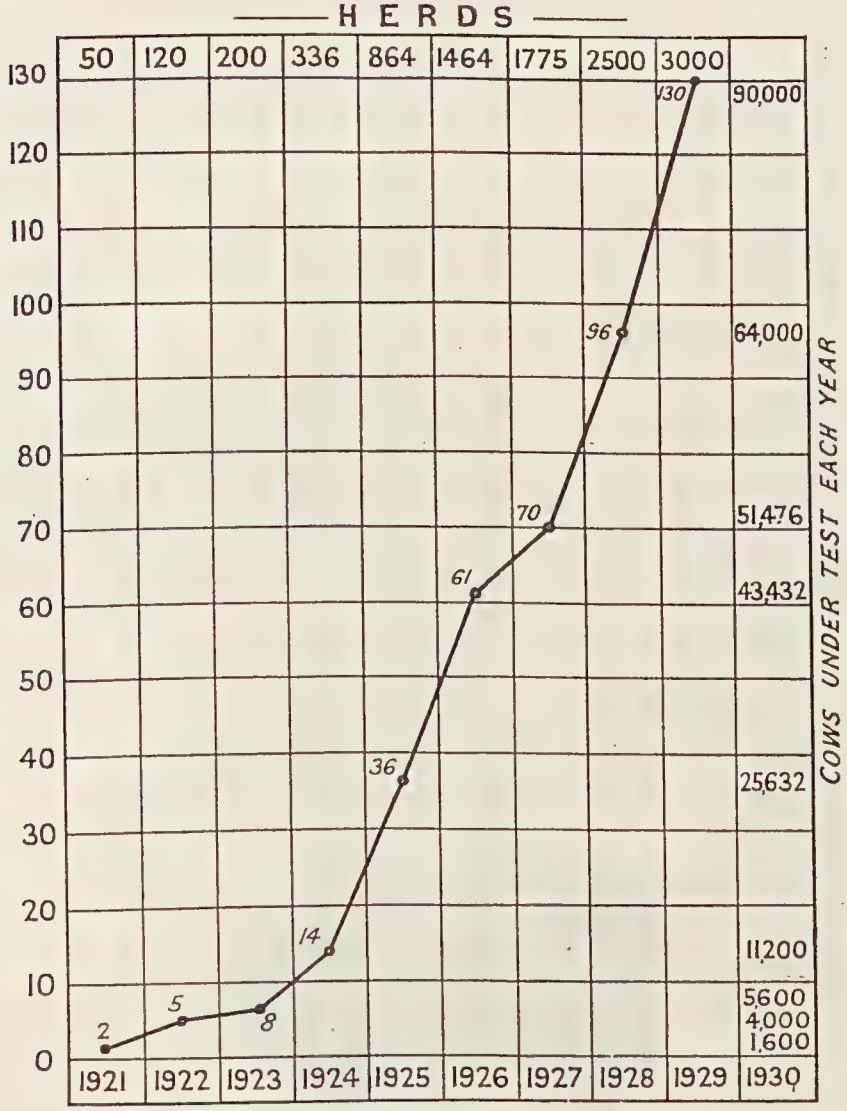
Owner.	Association.	Cows Tested.	Average lb. Butter-fat.
Herds of over 100 Cows.			
J. Moore and Co... ..	Yarram	106	343
Wm. Gunn	Leongatha	134	296
Reid Bros.	Bairnsdale	100	287
Pardew Bros.	Orbost	158	240
A. M. Black	Tarwin	134	231

Some Outstanding Herds—*continued.*

Owner.	Association.	Cows Tested.	Average lb. Butter-fat.
	HERDS OF 70 TO 100 COWS.		
J. Moore and Co.	Yarram	93	363
J. Batten	Warrnambool	81	286
J. Webster	Maffra	79	285
Mrs. A. Nixon	Orbost	91	231
	HERDS OF 50 TO 70 COWS.		
J. Moore and Co.	Yarram	59	393
D. Nicol	Tallangatta	50	345
Foster Bros.	Maffra	60	342
J. Clyne	Maffra	66	330
J. Mapleston	Neerim–Jindivick	62	325
J. Errey	Cobden	60	307
A. Crosthwaite	Kiewa	60	302
	HERDS OF 30 TO 50 COWS.		
H. Schier	Rochester	33	391
G. McLeish	Leongatha	36	356
H. Furphy	Dumbalk	45	363
G. Baid	Toora–Welshpool	44	325
	HERDS OF 20 TO 30 COWS.		
J. Roberts	Stony Creek	20	419
Smith Bros.	Mirboo North	26	404
T. Collins	Yinnar	22	405
S. Thomas	Yinnar	20	386
K. Mitchell	Narracan	23	382
J. Jephson	Yarram	29	377
J. Stockdale	Leongatha	27	376
F. Schiebel	Yinnar	21	376
J. Pearson	Stony Creek	27	375
H. Scharples	Jindivick–Neerim	23	375
J. Charlton	Stony Creek	24	372
C. W. McCowley	Rochester	25	373
E. Bond	Cohuna	20	360
Vaughan Bros.	Tongala	32	345
T. R. Flegg	Kerang	23	346
	HERDS OF UNDER 20 COWS.		
Geo. Horsburg	Yinnar	16	462
S. A. Ross	Stony Creek	13	410
G. W. Beasley	Swan Hill	17	397
Everson and Bateman	Warragul	17	392
J. Desmond	Rochester	17	395
H. Keele	Rochester	19	378
P. Freestone	East Murchison	19	386
C. J. Purce	Rochester	14	360
E. A. Raynor	Rochester	19	360
Geo. Bright	Stony Creek	17	360
H. Sawyer	Leongatha	16	359
A. J. Clark	Neerim–Jindivick	13	350
A. E. Poynter	Rochester	17	347
D. Jarvie	Rochester	16	340

DETAILED RESULTS FROM EACH CENTRE OF THE FOUR HERD-TESTING DISTRICTS.

On pages 232-240 are tabulated statements showing the number of cows tested, and the results obtained in the several centres of the four districts into which the State has been divided for herd-testing purposes by the Victorian United Cow-testing Association.



Graph Showing Development of Herd Recording in Victoria.

Gippsland Area.

I.—STATEMENT SHOWING NUMBER OF HERDS TESTED IN EACH CENTRE AND THE RESULTS; ALSO THE PERCENTAGE OF JUNIOR COWS AND THE NUMBER OF PURE-BRED BULLS IN EACH CENTRE.

Name of Unit.	No. of Herds tested.	No. of Cows tested.	Association Averages.			Per-centage Junior Cows.	No. of Pure-bred Bulls.
			Lb. of Milk.	Test.	Lb. Butter-fat.		
Yinnar, No. 1 ..	24	598	6,306·6	4·84	305·3	33	21
Maffra, No. 1 ..	28	984	6,068	4·7	287	40	24
Boolarra, No. 1 ..	24	458	6,210·3	4·55	281	30·6	15
Leongatha, No. 1 ..	26	845	6,048·5	4·64	280·6	35·6	12
Stony Creek, No. 1 ..	26	623	5,851	4·7	275	32·7	21
Narracan, No. 1 ..	26	563	5,630	4·31	270·3	32·7	14
Warragul	24	434	6,244	4·31	269·2	21·1	16
Yarram, No. 1 ..	23	836	5,669	4·6	266·3	37·3	22
Yinnar, No. 2 ..	26	702	5,896·4	4·5	265·3	28·2	15
Mirboo, No. 1 ..	25	579	5,880	4·39	257·4	42	13
Dumbalk	26	792	5,621	4·59	257	33	21
Kongwak	23	646	5,491	4·4	253	33·1	12
Jindivick — Neerim, No. 1	26	468	5,589	4·28	250	33	4
Jindivick — Neerim, No. 3	26	508	5,342·6	4·68	249·9	35	9
Toora–Welshpool ..	22	621	5,325	4·6	248·9	31	26
Leongatha, No. 2 ..	27	630	5,420·5	4·59	248·8	34·3	14
Yarram, No. 2 ..	24	984	5,362·4	4·63	248·6	25	15
Gainsborough ..	25	814	4,905	4·3	248·2	20	6
Lang Lang, No. 1 ..	20	390	5,284	4·58	242·2	34·6	9
Narracan, No. 2 ..	26	428	5,600	4·31	241·4	37·7	14
Wonthaggi, No. 1 ..	23	516	5,000	4·82	240·6	36	21
Wonthaggi, No. 2 ..	24	504	4,970·6	4·66	239·7	34	20
Lang Lang, No. 2 ..	19	370	5,428	4·4	239·7	18·4	9
Lang Lang, No. 3 ..	19	390	5,384	4·38	239·7	29·1	8
Korumburra ..	26	647	5,323	4·47	238	24·1	6
Yinnar, No. 3 ..	22	439	5,082	4·58	233·6	33	7
Sale, No. 1 ..	28	515	5,311·2	4·38	233·4	23	9
Jindivick — Neerim, No. 2	26	695	4,985	4·56	230·1	27·3	11
Traralgon, No. 1 ..	23	842	5,158	4·46	233·4	24	9
Bairnsdale ..	22	739	5,022	4·57	229·4	39	16
Loch	26	619	5,474	4·18	228	31·7	10
Maffra, No. 2 ..	26	1,001	4,895	4·64	228	36·4	13
Poowong	26	814	4,905	4·6	227	36·8	22
Sale, No. 2 ..	25	346	4,955·4	4·57	226·9	34·4	11
Traralgon, No. 2 ..	24	762	5,102·6	4·4	225·4	36·3	8
Stony Creek, No. 2 ..	26	615	4,849	4·56	220	26	16
Tarwin, No. 1 ..	15	728	4,942·1	4·41	217·8	17·7	11
Orbost	17	1,020	4,747	4·56	216·7	38	16
Maffra, No. 3 ..	27	972	4,964	4·2	210	33·4	16
Mirboo, No. 2 ..	22	415	5,000	4·2	210	30	9
Maffra, No. 4 ..	23	986	4,894	4·24	207	30·1	12
Tarwin, No. 2 ..	13	785	4,577	4·4	201	15·3	9
Total (42) ..	998	27,633	..	..	..	..	572
Average ..	..	..	5,345	4·4	242·3	35	..

II.—Details of the Number of Herds and the Number of Cows which Yielded Stated Quantities of Butter-Fat.

Name of Association.	Herds.								Cows.								
	Over 400 lb. Butter-fat.	350 to 400 lb. Butter-fat.	300 to 350 lb. Butter-fat.	250 to 300 lb. Butter-fat.	200 to 300 lb. Butter-fat.	150 to 200 lb. Butter-fat.	100 to 150 lb. Butter-fat.	Under 100 lb. Butter-fat.	Over 800 lb. Butter-fat.	700 to 800 lb. Butter-fat.	600 to 700 lb. Butter-fat.	500 to 600 lb. Butter-fat.	400 to 500 lb. Butter-fat.	300 to 400 lb. Butter-fat.	200 to 300 lb. Butter-fat.	150 to 200 lb. Butter-fat.	Under 150 lb. Butter-fat.
Yinnar, No. 1 ..	2	1	9	8	3	1	..	..	..	..	..	14	46	211	270	44	13
Maffra, No. 1 ..	..	..	9	14	5	..	..	..	..	..	1	3	49	305	507	108	11
Boolarra, No. 1 ..	..	1	2	5	11	5	..	..	..	..	..	1	2	51	234	128	42
Leongatha, No. 1 ..	..	3	7	10	4	2	..	..	..	..	..	5	35	234	416	118	37
Stony Creek, No. 1	1	3	3	5	7	7	..	..	..	..	..	1	28	146	230	156	62
Narracan, No. 1 ..	..	2	5	7	8	4	..	..	..	..	..	..	11	92	288	127	45
Warragul ..	..	1	5	12	4	2	..	..	..	..	..	3	21	128	234	35	13
Yarram, No. 1 ..	1	3	4	9	4	1	1	..	1	..	5	8	36	239	388	114	45
Yinnar, No. 2 ..	..	1	4	11	7	3	..	..	..	..	..	2	54	150	365	90	41
Mirboo, No. 1 ..	1	..	3	7	11	3	..	..	..	..	1	2	15	98	312	110	41
Dumbalk ..	..	1	2	9	12	2	..	..	..	..	1	2	35	360	240	110	44
Kongwak ..	..	..	3	11	6	3	..	..	..	..	2	12	140	322	118	35	17
Jindivick-Neerim No. 1	..	..	3	12	7	4	..	..	..	..	..	..	8	96	267	74	23
Jindivick-Neerim No. 3	..	1	3	3	12	6	1	..	..	..	..	4	11	92	299	171	31
Toora–Welshpool ..	..	..	4	6	9	2	1	..	..	..	..	..	11	159	337	86	28
Leongatha, No. 2 ..	..	..	6	11	7	3	..	..	..	..	..	..	5	132	318	104	81
Yarram, No. 2 ..	1	..	5	5	8	5	..	..	..	1	..	5	33	169	439	211	126
Gainsborough ..	..	..	..	2	8	13	2	..	..	..	..	1	14	215	383	47	54
Lang Lang, No. 1 ..	..	..	..	2	11	5	2	..	..	..	..	..	7	54	218	88	23
Narracan, No. 2 ..	..	..	..	4	5	12	5	..	..	..	..	2	30	117	193	65	21
Wonthaggi, No. 1 ..	..	..	1	4	5	10	3	..	..	..	..	..	12	90	244	114	44
Wonthaggi, No. 2 ..	..	..	..	6	9	6	3	..	..	..	..	..	10	92	266	108	40
Lang Lang, No. 2 ..	..	..	..	8	9	2	..	..	..	..	..	..	4	56	203	78	29
Lang Lang, No. 3 ..	..	..	2	6	8	3	..	..	..	..	..	..	5	69	177	101	38
Korumburra ..	..	1	1	10	6	7	1	..	..	..	..	1	9	113	310	120	94
Yinnar, No. 3 ..	..	1	3	14	4	..	..	..	..	..	..	..	17	136	228	49	9
Sale, No. 1 ..	..	..	4	8	7	6	..	..	..	..	..	..	7	59	245	133	71
Jindivick-Nerrim No. 2	..	1	4	7	11	3	..	..	..	..	..	..	10	116	266	113	80
Traralgon, No. 1 ..	..	..	1	7	9	3	2	..	..	..	..	1	7	85	360	257	122
Bairnsdale ..	..	..	..	3	13	6	..	..	..	..	..	..	2	98	418	136	85
Lock ..	..	1	1	11	10	3	..	..	..	..	..	..	7	68	333	124	87
Maffra, No. 2 ..	..	..	..	2	17	6	1	..	..	..	..	..	..	71	544	251	135
Poowong ..	..	..	..	11	13	2	..	..	..	..	..	..	3	77	490	168	76
Sale, No. 2 ..	..	..	3	9	7	4	2	..	..	..	..	..	1	47	162	56	80
Traralgon, No. 1 ..	..	..	..	8	9	5	2	..	..	..	..	..	4	120	378	175	85
Stony Creek, No. 2 ..	..	..	1	5	12	8	..	..	..	..	..	..	3	51	293	174	94
Tarwin, No. 1 ..	..	..	..	2	8	4	1	..	..	..	..	1	2	47	400	188	90
Orbost ..	..	..	1	2	9	5	..	..	..	..	..	..	2	93	499	287	139
Maffra, No. 3 ..	..	..	1	3	12	9	1	1	..	..	..	..	2	63	411	201	109
Mirboo, No. 2 ..	..	..	1	1	9	8	3	..	..	..	..	..	3	42	232	255	83
Maffra, No. 4 ..	..	..	..	3	11	8	1	..	..	..	..	3	4	85	422	269	200
Tarwin ..	..	..	..	..	9	3	1	..	..	..	..	..	1	48	417	219	100
	6	21	101	286	356	194	33	1	1	1	10	71	706	5,096	13,463	5,597	2,688

South-Western Area.

I.—STATEMENT SHOWING NUMBER OF HERDS TESTED IN EACH CENTRE AND THE RESULTS; ALSO THE PERCENTAGE OF JUNIOR COWS AND THE NUMBER OF PURE-BRED BULLS IN EACH CENTRE.

Name of Association.	No. of Herds tested.	No. of Cows tested.	Association Averages.			Percentage Junior Cows.	No. of Pure-breed Bulls.
			Lb. of Milk.	Test.	Lb. Butter-fat.		
Werribee South ..	24	420	6,299	4·12	259·5	34	15
Ballarat	14	198	5,733	4·29	245·9	28	14
Portland	9	212	5,319	4·55	242	20	11
The Sisters ..	29	950	5,352	4·39	235·2	33·2	24
Paschendale ..	27	807	4,860	4·59	223·3	28	21
Cobden	23	880	5,247	4·23	220·9	53·3	18
Noorat, No. 1 ..	19	904	5,740	3·8	220·6	19·4	14
Condah	26	596	5,202	4·2	219·2	38·3	22
Nalangil, No. 1 ..	26	822	5,047	4·2	215·8	34·3	15
Nalangil, No. 2 ..	24	613	5,036	4·22	213	33·4	9
Noorat, No. 2 ..	18	763	5,223	4·0	210·6	27·7	13
Derrinallum ..	26	743	4,680	4·5	210·6	20·7	14
Port Fairy ..	27	1,050	5.138	4·04	207	8·4	16
Camperdown ..	25	950	4,717	4·3	204	..	25
Apollo Bay ..	27	741	4,764	4·2	203·4	37·2	6
Warrnambool, No. 1	18	1,210	4,863	4·2	201·1	8·3	..
Macarthur.. ..	24	659	4,724	4·21	199	28·6	11
Warrnambool, No. 2	12	740	4,666	4·07	190	8·2	..
Warrnambool, No. 3	18	1,015	4,897	3·9	189·5	7	..
Coleraine, No. 1 ..	24	750	4,468	4·17	186·5	24·5	16
Penshurst ..	13	337	4,266	4·39	182·3	29	11
Coleraine, No. 2 ..	22	702	4,079	4·28	174·6	24·8	17
Casterton	19	441	3,928	4·25	167	25·2	9
Merino	21	574	3,653·7	4·4	162·6	29·7	3
Dreeite	26	735	3,815	4·25	162·4	23·5	..
Mortlake	18	580	3,740	4·2	159·5	20·9	7
Total (26) ..	559	18,392	..	..	..	..	301
Average ..	..	..	4,819	4·07	196	20·5	..

II.—Details of the Number of Herds and the Number of Cows which Yielded Stated Quantities of Butter-Fat.

Name of Association.	Herds.								Cows.							
	Over 400 lb. Butter-fat.	350 to 400 lb. Butter-fat.	300 to 350 lb. Butter-fat.	250 to 300 lb. Butter-fat.	200 to 350 lb. Butter-fat.	150 to 200 lb. Butter-fat.	100 to 150 lb. Butter-fat.	Under 100 lb. Butter-fat.	Over 800 lb. Butter-fat.	700 to 800 lb. Butter-fat.	600 to 700 lb. Butter-fat.	500 to 600 lb. Butter-fat.	400 to 500 lb. Butter-fat.	300 to 400 lb. Butter-fat.	200 to 300 lb. Butter-fat.	150 to 200 lb. Butter-fat.	Under 150 lb. Butter-fat.
Werribee South	..	..	2	10	9	3	..	..	..	..	..	1	19	112	166	78	44
Ballarat	..	7	3	3	..	1	..	..	..	..	..	3	16	60	20	36	63
Portland	..	3	2	4	..	..	..	..	..	..	..	..	4	49	100	41	18
The Sisters	..	..	..	8	18	3	..	..	..	..	..	..	8	126	540	181	95
Paschendale	..	..	1	2	16	7	1	..	..	..	..	..	6	69	428	209	95
Cobden	..	..	1	4	10	5	2	1	..	..	..	..	20	235	300	275	50
Noorat, No. 1	..	..	..	2	12	5	..	..	..	..	..	..	2	64	517	224	97
Condah	..	..	1	5	11	9	..	..	..	..	..	..	8	49	281	179	79
Nalangil, No. 1	..	..	1	3	12	9	1	..	..	..	..	..	4	70	343	247	158
Nalangil, No. 2	..	..	1	4	11	8	..	..	..	..	..	..	4	55	257	181	116
Noorat, No. 2	..	..	1	..	9	8	..	..	..	..	..	..	3	34	370	258	98
Derrinallum	..	..	..	2	12	7	5	..	..	..	..	..	..	51	339	194	159
Port Fairy	..	..	1	3	13	10	..	..	..	..	..	..	2	75	501	277	195
Camperdown	..	..	..	2	13	10	..	..	..	..	..	..	2	235	509	163	141
Apollo Bay	..	..	1	3	9	12	2	..	..	..	..	..	4	47	346	206	138
Warrnambool, No. 1	..	..	..	1	9	7	1	..	..	..	..	..	2	91	533	254	330
Macarthur	..	..	..	..	13	10	1	..	..	..	..	..	1	22	274	202	160
Warrnambool, No. 2	..	..	..	2	3	5	2	..	..	..	..	..	1	48	297	180	214
Warrnambool, No. 3	..	..	..	1	7	10	..	..	..	..	..	..	12	54	475	262	211
Coleraine, No. 1	..	..	..	1	5	15	3	..	..	..	..	..	..	27	216	240	267
Penshurst	..	..	..	1	4	5	3	..	..	..	..	1	..	11	129	109	87
Coleraine, No. 2	..	..	..	1	4	13	4	..	..	..	..	..	..	16	256	286	144
Casterton	..	..	..	..	4	9	6	..	..	..	..	..	1	5	137	147	151
Merino	..	..	..	..	2	13	6	..	..	..	..	..	..	5	119	214	236
Dreeite	..	..	..	..	1	15	8	2	..	..	..	..	1	16	145	213	358
Mortlake	..	..	..	..	1	13	4	..	..	..	..	..	..	2	157	232	189
	..	10	15	62	208	212	49	3	..	..	..	5	120	1,628	7,755	5,088	3,796

Darkie—the Most Consistent Grade Cow in Victoria.
(Owned by Messrs. Moore & Co., Tooloonook, Victoria.)
Average butter-fat for five years—523 lb.

Goulburn Valley (Irrigation) Area.

1.—STATEMENT SHOWING NUMBER OF HERDS TESTED IN EACH CENTRE AND THE RESULTS; ALSO THE PERCENTAGE OF JUNIOR COWS AND THE NUMBER OF PURE-BRED BULLS IN EACH CENTRE.

Association.	Herds.	Cows.	Milk.	Test.	Butter-fat.	Junior Cows.	Pure-bred Bulls.
Swan Hill	25	597	6,061	4·55	276·6	46·8	19
Rochester	29	417	5,880	4·59	270	46·2	10
Rochester, No. 2 ..	26	379	5,450	4·77	260	42·2	14
Tongala, No. 1	28	453	6,399	4·27	272	50	28
Stanhope	27	618	5,589	4·28	250·2	33	12
Cohuna	25	705	5,961	4·04	241·2	43·2	17
Tongala, No. 2	30	522	5,756	4·12	237	46·4	30
Tongala, No. 3	28	590	5,434	4·29	233·1	43·4	23
Koroop	25	771	5,367	4·2	229	34·5	18
Kerang, No. 1	22	617	5,254	4·31	226·4	39·2	19
East Murchison ..	25	611	5,144	4·4	224	36	16
Kerang, No. 2	22	639	5,217	4·2	22·11	39·3	19
North Shepparton ..	29	300	4,348	4·59	199·6	45	18
Pyramid	20	538	4,489·7	4·39	197	32·5	12
Murrabit	21	323	4,536	4·16	188·9	32·3	16
Leitchville	26	603	4,376	4·02	176	32·2	16
Total (12) ..	408	8,683	..	..	..	..	287
Average ..	..	..	5,407	4·24	229·4	40·1	..

Dot—Highest Producing Grade Cow in Victoria.

(Owned by Messrs. Moore & Co., Tooloonook, Gippsland.)

Milk, 14,635 lb.; Test, 5·66; Butter-fat, 829·4 lb.

Yielded 90 lb. butter-fat in last sub-period and averaged over 3 lb. butter-fat daily for nine months.

II.—Details of the Number of Herds and the Number of Cows which Yielded Stated Quantities of Butter-Fat.

Name of Association.	Herds.								Cows.								
	Over 400 lb. Butter-fat.	350 to 400 lb. Butter-fat.	300 to 350 lb. Butter-fat.	250 to 300 lb. Butter-fat.	200 to 250 lb. Butter-fat.	150 to 200 lb. Butter-fat.	100 to 150 lb. Butter-fat.	Under 100 lb. Butter-fat.	Over 800 lb. Butter-fat.	700 to 800 lb. Butter-fat.	600 to 700 lb. Butter-fat.	500 to 600 lb. Butter-fat.	400 to 500 lb. Butter-fat.	300 to 400 lb. Butter-fat.	200 to 300 lb. Butter-fat.	150 to 200 lb. Butter-fat.	Under 150 lb. Butter-fat.
Swan Hill ..	1	1	14	6	3	..	..	..	..	..	..	2	26	157	217	65	130
Rochester, No. 1	..	3	5	5	9	3	1	..	..	..	1	9	18	100	167	55	29
Rochester, No. 2	..	4	5	8	8	4	..	..	..	..	..	5	41	135	150	48	38
Tongala, No. 1 ..	..	2	4	13	6	2	1	..	..	..	..	2	29	126	196	60	40
Stanhope ..	1	1	9	7	5	3	1	..	..	..	..	6	28	146	242	93	88
Cohuna ..	..	1	2	6	13	3	..	..	..	..	..	1	11	126	349	143	75
Tongala, No. 2 ..	..	..	3	11	10	2	2	..	..	..	..	..	5	73	255	92	165
Tongala, No. 3 ..	..	..	1	7	15	7	..	..	..	..	..	1	14	128	233	87	59
Koroop ..	..	..	..	6	13	6	..	..	..	..	..	1	5	65	348	132	220
Kerang, No. 1 ..	..	..	2	5	11	4	..	..	..	..	..	..	15	85	297	158	62
East Murchison ..	..	1	3	3	9	7	1	1	..	..	..	..	3	7	79	284	238
Kerang, No. 2 ..	..	..	..	4	15	3	..	..	..	..	..	..	4	61	366	145	63
North Shepparton	..	..	..	4	13	9	3	..	..	..	..	..	2	38	137	58	65
Pyramid ..	1	1	1	2	7	6	2	..	..	..	..	4	22	106	176	122	108
Murrabit ..	..	..	1	6	5	4	5	..	..	..	..	..	..	27	75	63	158
Leitchville ..	..	.	..	1	5	15	5	..	..	..	..	..	3	44	252	199	105
	3	14	50	94	147	78	21	1	..	..	1	31	226	1,424	3,539	1,819	1,643

North-Eastern Area.

I.—Statement showing Number of Herds Tested in Each Centre and the Results; also the Percentage of Junior Cows and the Number of Pure-bred Bulls in Each Centre.

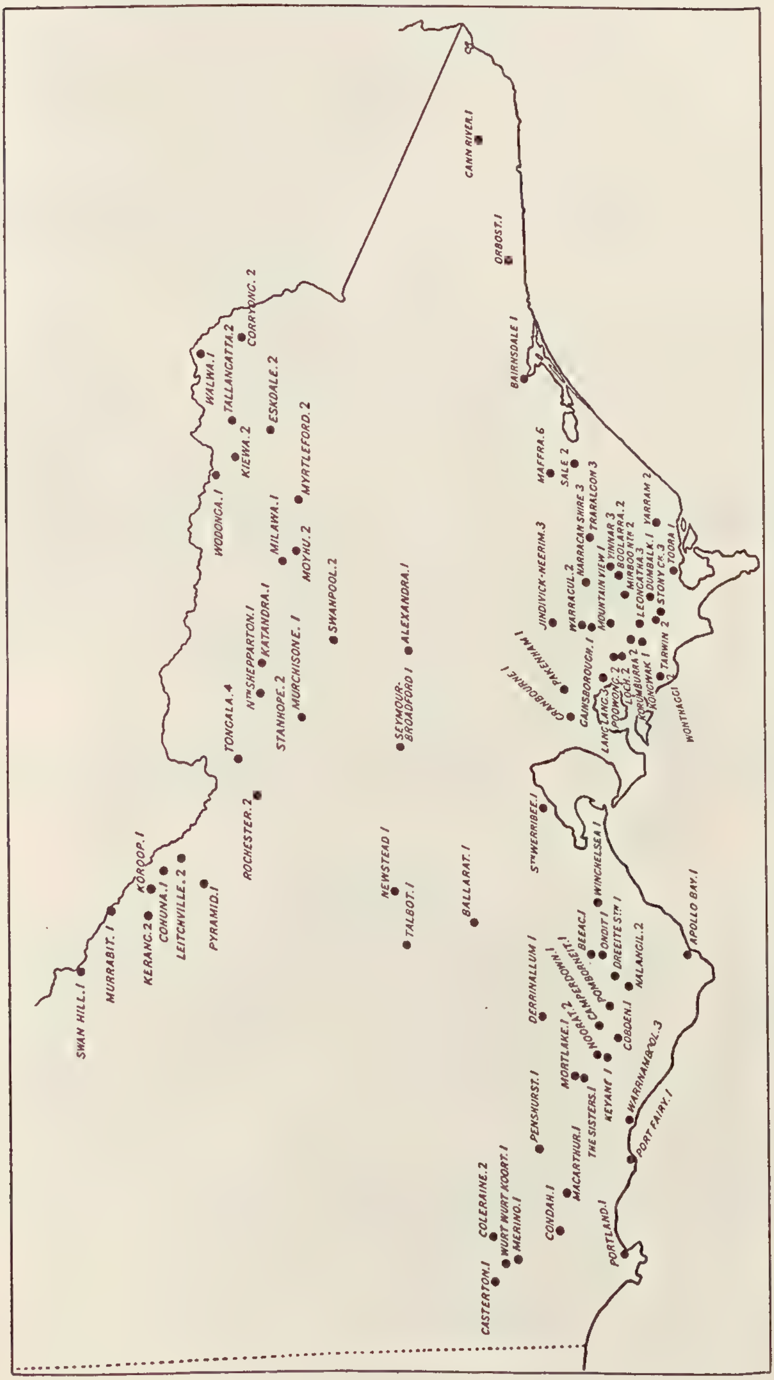
Association.	Herds.	Cows.	Milk.	Test.	Butter-fat.	Junior Cows.	Pure-bred Bulls.
Myrtleford	26	697	5,621	4·5	256·8	44·4	25
Tallangatta, No. 1 ..	24	678	5,716·3	4·47	255·3	30	18
Alexandra	26	767	5,251	4·5	236·3	20	17
Millewa	22	582	4,765	4·5	214·5	28·3	18
Seymour	19	283	4,594	4·64	213·6	29	8
Broadford							
Kiewa, No. 1	16	874	4,357	4·6	207	34	14
Upper Murray, No. 1 ..	22	874	4,515	4·47	202·2	22·6	23
Upper Murray, No. 2 ..	23	933	4,453	4·44	198	32·3	24
Eskdale	24	915	4,498·2	4·37	196	18	20
Moyhu	25	685	4,228·3	4·49	190	29·2	11
Kiewa, No. 2	20	822	3,964	4·5	185	27	20
Walwa	17	459	3,944·5	4·26	168	25·6	9
Tallangatta, No. 2 ..	Records not available						
Swan Pool							
Total (13) ..	264	8,569	..	..	..	..	207
Average	..	..	4,704	4·39	206·7	27	..

II.—DETAILS OF THE NUMBER OF HERDS AND THE NUMBER OF COWS WHICH YIELDED STATED QUANTITIES OF BUTTER-FAT.

Name of Association.	HERDS.								COWS.								
	Over 400 lb. Butter-fat.	350 to 400 lb. Butter-fat.	300 to 350 lb. Butter-fat.	250 to 300 lb. Butter-fat.	200 to 250 lb. Butter-fat.	150 to 200 lb. Butter-fat.	100 to 150 lb. Butter-fat.	Under 100 lb. Butter-fat.	Over 800 lb. Butter-fat.	700 to 800 lb. Butter-fat.	600 to 700 lb. Butter-fat.	500 to 600 lb. Butter-fat.	400 to 500 lb. Butter-fat.	300 to 400 lb. Butter-fat.	200 to 300 lb. Butter-fat.	150 to 200 lb. Butter-fat.	Under 150 lb. Butter-fat.
Myrtleford ..	..	..	3	12	7	4	..	..	..	..	..	1	15	173	355	98	55
Tallangatta ..	..	..	6	7	7	3	1	..	..	..	..	1	21	213	301	117	25
Alexandra ..	..	..	3	6	9	5	3	..	..	..	..	..	2	41	312	252	160
Millewa	..	..	..	5	10	5	2	..	..	..	..	..	3	45	279	156	99
Seymour–Broadford ..	..	1	1	2	9	4	1	1	..	..	..	1	3	30	121	82	46
Kiewa, No. 1 ..	..	..	1	4	3	5	3	..	..	..	..	..	4	78	359	283	150
Upper Murray, No. 1	..	..	1	6	6	7	2	..	..	..	..	..	1	70	343	273	187
Upper Murray, No. 2	..	..	..	4	12	5	2	..	..	..	1	..	3	35	429	305	160
Eskdale ..	..	..	..	2	10	10	2	..	..	..	..	..	..	38	410	321	146
Moyhu	..	..	..	3	5	10	7	..	..	..	..	..	3	34	276	189	183
Kiewa, No. 2 ..	..	..	..	2	6	9	3	..	..	..	..	..	1	18	253	261	289
Walwa	..	..	..	1	3	9	4	..	..	..	..	1	..	13	160	167	118
Tallangatta, No. 2 Swanpool ..																	
	..	1	15	54	87	76	30	1	..	..	1	4	56	788	3,598	2,504	1,618

Statement showing Increased Average Production of Cows in Associations of which Records are available.

Name of Association.	Year Operations commenced.	Number of Cows tested.	Average Yield Butter-fat.	Association Reports, 1928–29.		Average Increase per Cow Butter-fat.
				Number of Cows tested.	Average Yield per Cow Butter-fat.	
			lb.		lb.	lb.
Leongatha ..	1925	684	147	845	280·6	133·6
Maffra	1925	848	166	984	287	121
Yinnar	1921	676	196	598	205·3	109·3
Boolarra	1923	595	173	458	281	108
Narracan	1923	473	170	428	270·3	100·3
Mirboo .. .. / Dumbalk	1922	827	167	1,371	257	90
Myrtleford ..	1925	672	174	697	256·8	82·8
Sisters	1926	771	153	950	235·2	82·2
Stony Creek ..	1922	670	198	623	275	77
Toora .. .. / Welshpool	1922	846	175	621	249	74
Kongwak	1925	856	180	646	253	73
Yarram	1923	2,030	188	1,820	257	69
Paschendale ..	1925	836	167	827	224	57
Tallangatta ..	1925	839	200	678	255·3	55·3
Ballarat	1925	317	191	198	245·9	54·9
Alexandra	1926	789	182	767	236·3	54·3
Moyhu	1926	653	144	618	190	46
Poowong	1925	731	186	814	227	41
Tarwin	1921	1,100	170	1,513	209	39
Noorat	1926	1,108	180	1,667	215·6	33·6
Eskdale	1925	1,233	165	915	196	31
Tongala	1925	1,363	214	1,565	245	31
Rochester ..	1925	322	258	417	270·6	12·6
Swan Hill ..	1925	620	273	597	276·6	3·6


SWAN HILL.1
MURRABIT. 1
KERANG.2
KOROOP.1
COHUNA.1
LEITCHVILLE. 2
PYRAMID.1
ROCHESTER.2
TONGALA.4
NTH SHEPPARTON.1
KATANDRA.1
STANHOPE.2
MURCHISONE. 1
WODONGA.1
WALWA.1
TALLANGATTA.2
CORRYONG. 2
KIEWA.2
ESKDALE.2
MILAWA.1
MOYHU.2
MYRTLEFORD.2
SWANPOOL.2
SEYMOUR-BROADFORD 1
ALEXANDRA.1
NEWSTEAD 1
TALBOT.1
BALLARAT.1
CANN RIVER.1
ORBOST.1
BAIRNSDALE 1
MAFFRA.6
SALE 2
TRARALGON 3
NARRACAN SHIRE 3
JINDIVICK-NEERIM.3
WARRAGUL.2
MOUNTAIN VIEW 1
YINNAR 3
BOOLARRA.2
MIRBOO NTH 2
LEONGATHA.3
DUMBALK.1
STONY CK.3
TOORA 1
YARRAM 2
TARWIN 2
KONGWAK 1
KORUMBURRA 2
LOCH.2
POOWONG.2
LANG LANG.3
GAINSBOROUGH.1
PAKENHAM 1
CRANBOURNE 1
WONTHAGGI 2
STH WERRIBEE.1
WINCHELSEA 1
APOLLO BAY.1
DREEITE STH 1
NALANGIL.2
ONDIT 1
BEEAC.1
CAMPERDOWN.1
POMBORNEIT.1
NOORAT.2
MORTLAKE.1
DERRINALLUM 1
COBDEN.1
WARRNAMBOOL.3
KEYANG 1
THE SISTERS.1
PENSHURST.1
MACARTHUR.1
PORT FAIRY.1
PORTLAND.1
CONDAH.1
COLERAINE.2
WURT WURT KOORT.1
MERINO.1
CASTERTON.1

Map Showing where there are Herd Recording Associations in Victoria.

(The figures represent the number of units in each district.)

Production of Herds in Four Herd Testing Areas.

District.	No. of Herds tested.	Over 400 lb.	350 lb. to 400 lb.	300 lb. to 350 lb.	250 lb. to 300 lb.	200 lb. to 250 lb.	150 lb. to 200 lb.	100 lb. to 150 lb.	Under 100 lb.
Gippsland ..	998	6	21	101	286	356	194	33	1
Goulburn Valley ..	408	3	14	50	94	147	78	21	1
North-Eastern ..	264	..	1	15	54	88	75	30	1
Western ..	559	..	10	15	62	207	212	49	3
Totals ..	2,229	9	46	181	396	799	559	133	6
1927–28 ..	1,468	..	18	67	178	500	514	164	23

Production of Cows in the Several Associations in the Herd Testing Areas.

District.	Total Cows tested.	No. of Cows yielding over 800 lb.	Over 700 lb.	Over 600 lb.	Over 500 lb.	Over 400 lb.	Over 300 lb.	Over 200 lb.
Gippsland ..	27,633	1	1	10	71	706	5,096	13,463
Goulburn Valley ..	8,683	..	..	1	31	226	1,424	3,539
North-Eastern ..	8,569	..	..	1	4	56	788	3,598
Western ..	18,392	..	..	..	5	120	1,628	7,755
Totals ..	63,277	1	1	12	111	1,108	8,936	28,355

60.8 % of all cows tested yielded over 200 lb. butter-fat.

SUMMARY OF YEAR'S HERD RECORDING WORK.

Details of Number of Herd Tests and Results obtained by all Herd Testing Associations in Four State Areas.

District.	No. of Associations.	No. of Herds tested.	No. of Cows tested.	Percentage of Cows under 4 years old tested.	Percentage of Herds using Pure-bred Bulls.	Average No. of Cows in Herds.	Average Production per Cow.		
							Milk.	Butter-fat Test.	Butter-Fat.
				%	%		lb.	lb.	lb.
Gippsland ..	42	998	27,633	35	63·7	27·7	5,345	4·4	242·3
Goulburn Valley	16	408	8,683	41	70	21·3	5,407	4·24	229·4
North-Eastern ..	12	264	8,569	27	57	33	4,704	4·39	206·7
Western ..	26	559	18,392	20·5	54	31·1	4,819	4·07	196
Totals ..	96	2,229	63,277	30·4	61·5	28·3	5,080·3	4·38	222·37

Of the 63,277 cows tested 485 were exempted and excluded from herd averages.
Of the pure-bred bulls used 68·7 % were Jerseys.
13·0 % were Ayrshires.
7·0 % were Friesians.
6·3 % were Milking Shorthorns.
4·0 % were Red Polls.
1·0 % were Guernseys.
100·0 %

(To be continued.)

SOIL UNIFORMITY TRIAL.

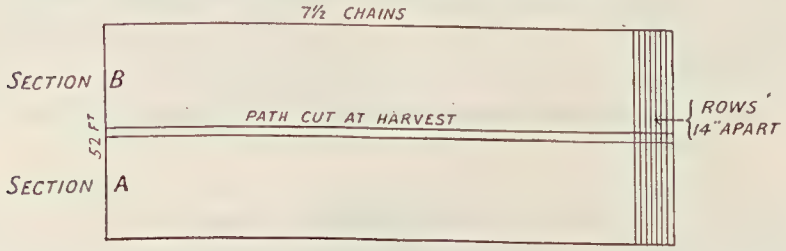
Experiment conducted on the "Old Orchard Field," Plant Research Laboratory, Burnley, 1929.

Report by H. C. Foster, M.Ag.Sc., and A. J. Vasey, B.Ag.Sc., Agricultural Research Officers.

This trial was conducted during the year 1929 for the purpose of determining the uniformity of the soil in the "Old Orchard Field" at the Burnley laboratories. The area is to be used for the growing of small test plots of various plants, and it is hoped, in addition, to obtain from the results some indication as to the size of plots necessary and as to the accuracy obtained from a yield point of view.

Since there was no definite idea as to which crop would be the most frequently used, wheat was chosen as being the most general crop. Further, since the type of district and of climate, in addition to the prevalence of birds, favoured the production of hay, it was decided to measure the wheat crop finally as weight of dried produce rather than as grain.

Accordingly, after a thorough cultivation, the area was sown down to wheaten hay (variety, Golden Grain x Bobs, an early quick-maturing type, the seed of which was supplied from the State Research Farm, Werribee). The seed, mixed with superphosphate, was sown by a "Planet Jr." single-hoe seeder in rows 14 inches apart, and running across the width of the field in the following manner:—



The crop was cut on the 2nd-4th December by a single-horse mower after the area had been bisected longitudinally by a small path. The unit plot was made 26 feet long by a width of three of the original rows. Thus, by running the mower in the direction of the rows across the field, a single plot was cut with each run of the machine. The area thus included was composed of 10.1 square yards (approximately 1/500 acre).

The yields were obtained by weighing the dried produce from each plot on the 23rd December, when the soil was shown to have yielded at the rate of 5.45 tons of hay per acre, which, when one remembers that the crop was sown rather late in the season and that the rows were 14 inches apart, illustrates the high fertility of the area.

The yield figures prove very interesting In the first place they show that the field is fairly uniform, both transversely (as shown by the agreement between yields from corresponding plots in the two sections) and longitudinally. The yields from those plots contained in the first chain's length of land show the greatest variation, and if great accuracy were required it would be a good policy to avoid this area.

On treating the results statistically, we find that the average yield per plot is 25.5 ± .20 lb. (8.0 per cent.). This is equivalent to a standard deviation of the order of 11.9 per cent., which is rather higher than that obtained in the investigations on wheat at Werribee. There are two possible explanations for this increase in variability—

(*a*) that a vegetative crop such as weight of hay may have, under normal conditions, a greater range of variance; or, in other words, that it may allow a greater range of yield to be exhibited than would a grain crop such as wheat;

(*b*) that in the same way the inter-cultivation and the greater width between rows may have allowed the maximum range of yield to be developed.

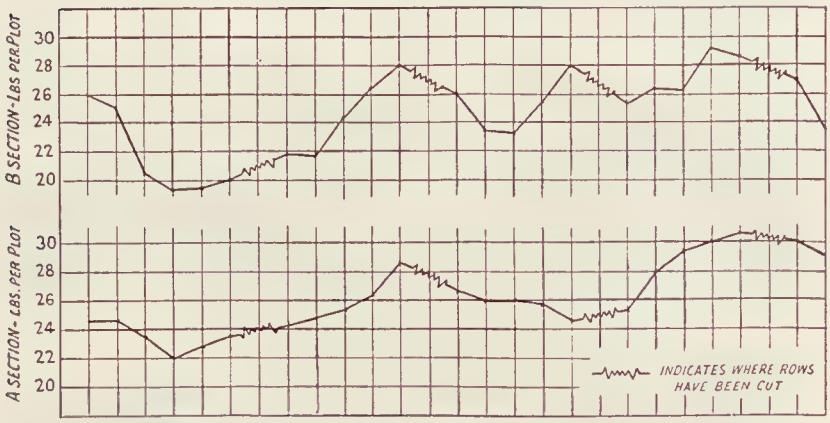


Fig. 1.—Average Yield from Plots composed of Five Adjacent Unit Plots.
This has been done in order to avoid small local variations in yield.

To find the optimum size of plot required for a small error, the S.D. has been obtained from various sized plots. The yields from adjacent plots have been grouped together in order to obtain yields from plots of twice, four, &c., times the original size.

As the figures indicate, little reduction in S.D. will be obtained by increasing the size of plot above twice or three times the unit combination used in harvesting. Indeed, the increase in error in using the actual unit of three rows is not very considerable.

With regard to the number of replicates required, a number (four to five) similar to that found for the Werribee wheat trials will be the most economical to use.

The curve given in the graph is a theoretical curve calculated from the formulæ—

$$\text{S.D.}_x = \frac{\text{S.D.}_y}{x}$$ where S.D._x = S.D. for the given number of replicates.

S.D._y = S.D. for a single result.

x = number of replicates.

The actual curve would be very similar to that derived in the previously mentioned trials.

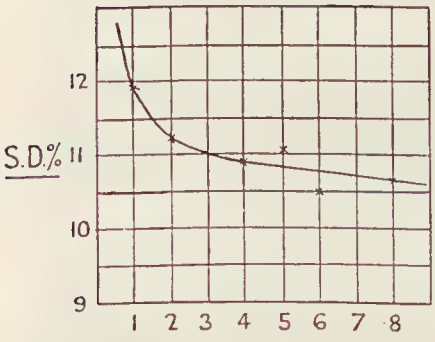


Fig. 2.—Graph showing S.D. (%) calculated from single plots and from various numbers of adjacent plots combined.

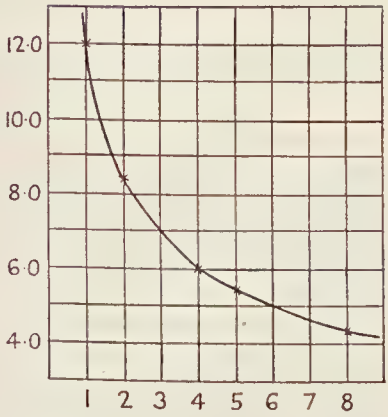


Fig. 3.—Graph showing S.D. (%) from single plots and from various numbers of replicates.
(Theoretical curve.)

TABLE I.

No. of Plots combined together.	Area.		S.D.
	sq. yds.	ac.	%
Single plots ..	10·1	·002	11·9
2 plots ..	20·2	·004	11·3
4 ,, ..	40·4	·008	10·9
5 ,, ..	50·5	·011	11·1
6 ,, ..	60·6	·013	10·5
8 ,, ..	80·8	·017	10·7

TABLE II.

No. of Replicates.	S.D.
	%
Single plots ..	11·9
2 replicates ..	8·4
4 ,, ..	6·0
5 ,, ..	5·3
8 ,, ..	4·2

SUMMARY.

During the past year a uniformity trial was conducted on an area of land at the Burnley laboratories in an endeavour to get a measure of the evenness of the land and to obtain some idea of the accuracy which could be obtained in yield trials on this land.

The area was sown to wheat, which was subsequently harvested as hay. The soil showed a fairly uniform yield at the rate of 5.45 tons of dried hay per acre.

The degree of variation is such that the S.D. of the yields from plots of approximately 1/500 acre in area is about 12 per cent. Further, that this error is not reduced very much by increasing the size of plot.

As far as the size and number of replications of plots are concerned, the hay yield figures indicate that an area of somewhere about 1/200 acre replicated four to five times would be the best to use for a trial similar to and held under similar climatic conditions as that conducted above.

CONTROL OF ORCHARD INSECT PESTS.

By H. W. Davey, Chief Orchard Supervisor.

When it is remembered that insects form about four-fifths of the animal kingdom, and that well over 250,000 species have already been named and described, it is not surprising that some members of this vast army have made themselves pests, both to the farmer and horticulturist.

Insects are adapted for all climates and all foods, and are structually more complicated than any other animal. In addition their outside covering is, as well as their tracheal breathing system, composed of a very wonderful substance known as chiton, which is almost imperishable.

For an example, if a most delicate insect such as a mosquito is placed in a vessel containing liquor potassa and left in the latter for a long period of time, this chiton is not affected or dissolved. An insect can be boiled in the same liquid potassa or caustic soda without affecting its integument.

In fact, in preparing insect mounts for the microscope, the insects are usually soaked in liquor potassa for days or even weeks, until the potassa has completely dissolved away all the fats and fleshy parts, thus leaving the exoskeleton of chitonous material clear and transparent.

After this, the integument is boiled in a saturated solution of carbolic acid to expel any air, and is then fit to be mounted in Canada balsam. The wonderful chiton that forms the outer covering of insects will resist boiling in acids, alkalies or alcohol.

From this, it can be easily understood that scale insects are much more readily killed when immature than when encased in old scales. The usual means employed for combating scale insects on deciduous trees are oil or lime sulphur sprays when the trees are dormant, and every part consequently is easily accessible to the insecticide applied.

In the case of evergreens, the best treatment is by fumigation. This is accomplished by covering the tree to be treated with a gas-proof tent, inside of which hydrocyanic acid gas is generated.

The Value of White Oils.

The increasing popularity of oil applications for the control of insect pests is satisfactory, and their use would become still more in favour if the majority of growers were better informed as to how insects breathe.

Land vertebrate animals, as is well known, breathe by inhaling air into the lungs, whereas insects breathe by means of a wonderful system of air-tubes, known as the tracheal system. These tubes or trachea ramify and penetrate to all parts of their bodies.

In the case of insects the air is passed along the trachea, even to the antennae and legs, which are thus kept aerated; with the land vertebrates the blood is brought into contact with the air in the lungs for its aeration. It can thus be seen that the breathing of insects is quite different from that of the land vertebrates.

The air enters the tracheal system by means of small openings on the sides of the insect's body; these openings are called the spiracles. This curious method of breathing by insects makes them especially vulnerable to oil sprays, for although the spiracles can exclude dust, and even water, for long periods, they cannot keep out oils. Thus when an oil spray is applied, it enters the spiracles and then soaks along the tracheal system to all parts of the body, and so suffocates the insect.

It is owing to this system of breathing that insects can live in air-tight boxes having practically little or no air. For the same reason an insect will not drown until sufficient time elapses for the water to gradually penetrate to all parts of its body. It cannot even be suffocated by poisonous fumes until the gases permeate all parts of the trachea.

Several instances occurred during the last appearance of the Fruit Fly where orchardists thought they were doing the correct thing in throwing fly-infested fruit into dams or water channels, under the impression that the maggots would drown; yet it was certain that in several cases very many of the larvae escaped drowning.

Insects that have been chloroformed or placed in a killing-bottle for hours, or even immersed in methylated spirits for the same length of time, will frequently be found to have made a complete recovery after having been pinned out on the setting-board. But once place a mature insect in a thin oil and nothing can save its life. It can, therefore, be easily understood how the use of spraying oils is so effective in killing insects if properly applied.

From experiments now being conducted at Doncaster and Templestowe by Mr. A. A. Hammond, Senior Orchard Supervisor, it is hoped that a lot of useful information will be obtained regarding the more effective control of codling moth.

Application of five different brands of arsenates and five different kinds of white oils have been made by leading purveyors of control sprays. These oils have been applied at different strengths, ranging from 1 gallon to 40 to 1 gallon to 100. When the results of these tests are finalized, they will be published in this *Journal*.

White oil, either with or without the addition of arsenate of lead, and the placing of lures in the trees are rapidly become the favorite means of orchardists for controlling codling moth. Any form of control that goes to lessen the quantity of arsenic applied to the fruit is of the first importance now, owing to the strictness of the British authorities in placing an embargo on all fruits showing traces of arsenic. As white oils for codling control will lessen the amount of arsenic used, this effectiveness is of the greatest value to our apple export industry.

In this connexion there are many interesting points yet to be solved as to how the application of white oil protects the fruit from attack by the codling moth. It is now recognized that the organs of smell in insects are situate mainly in the antennae, and they may, therefore, be regarded as the principal olfactory organs.

These white oils are all more or less ovicidal in their action, and many codling eggs may be destroyed by them. Further, the greasy nature of the film of oil covering the fruits as well as the rest of the tree may prevent the proper adhesion of eggs laid after the oil has been applied to the tree, and so guard against their being hatched.

Again, as most insects select their food by the sense of smell, the film of oil, which should completely cover all parts of the tree, may, by its presence, largely prevent the moth recognizing her food plant, and thus retard to a very great extent the deposit of her eggs. But, whatever the cause, the use of these oils in codling control (as well as with other pests) has already given some excellent results.

The Use of Lures.

The hanging of pots containing lures in apple trees has been successful in capturing large numbers of codling moths, light brown apple moths, and cutworm moths of several species.

The lure now being used in conjunction with the spraying tests previously mentioned is composed as follows:—1 quart mollasses to 4 gallons water, with 2 oz. yeast to start fermentation. Some of this is poured into jam tins or such like vessels, and these are suspended in the trees. Although many codling moths have been destroyed by means of these lures, useful insects, such as bees, ladybirds, lacewings, &c., are not attracted by it. This evidently shows that the fermentation of the molasses water, while being attractive to codlings and noctuid moths, is distasteful to bees, &c. On the other hand, some lures will destroy bees by the hundred, yet never attract a codling moth.

The lures now in use in these experiments are examined at intervals, when the number and species of insect taken are noted.

Delayed Metamorphosis.

Many orchardists have been astonished at the very mild attacks from the codling during the early part of this season, and even up to the end of February in the southern districts, and there is no doubt they have been much less severe than usual. This applies to both apple and pear trees.

There may be several reasons for this, the chief of which is probably the cold wet weather during the spring months, which was unfavorable to the emerging of moths. This to some extent is proved by the fact that the moth has been so much more numerous in the up-country orchards than in districts nearer to Melbourne.

I have, on previous occasions, remarked on the variation in the times of the moths' appearance, even when the caterpillars lived under conditions exactly alike. This variation was proved by placing a codling bandage from a tree in a breeding case at the end of December, 1926. During the following month seven moths emerged,

by the end of February five more had been hatched, and early in March six more moths made their appearance. The rest of the grubs remained as caterpillars during the winter to emerge as moths the following spring. These differences in the time of emergence of the perfect insect, while being very perplexing to us, make for the codling's benefit, by enabling it to carry over during bad seasons.

There is, however, on record a more wonderful instance of delayed metamorphosis of a moth belonging to the family *Lasiocampidae*, of which we have several species in Australia (the well-known Pinaro moth of our apple trees belongs to this family). Caterpillars of the moth mentioned were all reared from the one batch of eggs, and all of them had finished feeding within fourteen days of one another, yet from the time of the emergence of the first moth to that of the last, three years elapsed. Therefore, the fact that codlings are less prevalent than usual this season in Southern Victoria should not cause growers to relax in any way endeavours for their control, because, given the right conditions, a swarm of moths may emerge at any time during warm weather.

If this should occur, the caterpillars, owing to the now forward condition of fruit, could cause much greater damage in a very short time than would have been possible for them earlier in the season.

The Necessity for Destroying Waste Fruit.

Frequently in large orchard properties, as well as in small ones, sufficient care is not taken to destroy fruit which has fallen. In some instances, after this fruit has been carefully gathered up, it is dumped on waste land just outside the orchard. This, in addition to being a dirty practice, is a stupid one. In the first place, the chief reason for gathering up such fruit is for the purpose of controlling plant diseases, therefore unless it is buried or sterilized there can be little sense in going to the labour and expense of picking it up, merely to dump it a short distance away from the trees.

Leaving fallen fruit beneath the trees without destroying it does not make for orchard hygiene. Apples that have fallen as a result of attacks from codling caterpillars should be collected and disposed of at once, otherwise (especially if the weather is hot) the caterpillars will very quickly vacate the fallen fruit, and probably again climb the tree and attack sound fruits. If they are nearly matured, they will vacate the fruit in hot weather, but will pupate in the nearest shelter they can find, the only noticeable difference being that moths that have metamorphosed from such caterpillars are usually considerably smaller in size than are those whose caterpillars had been fully fed before pupation took place. These smaller moths are just as capable of producing eggs as are their larger and better developed relatives.

To leave fruit lying about the ground is bad practice quite apart from the fact that it is "codlined." In the case of stone fruits attacked by brown rot fungus, any insects feeding on them can easily spread the spores of this fungus to clean fruits. In addition, decaying fruit provides breeding places for such insects as Carpophilus beetles, which may soon increase to plague numbers that will effect great damage by causing sound fruits to fall, and by blemishing others.

THE RELATIONSHIP BETWEEN UNDULANT FEVER AND EPIZOOTIC ABORTION.

As long ago as 1896, when the brilliant researches of Bang and Stribolt revealed the cause of epizootic abortion in cows and the fact that the disease was experimentally transmissible to other domesticated animals, there was reason to consider the question whether the human subject might also be susceptible to infection. Naturally, at that time it was supposed that if such infection actually took place evidence of it should be sought in connexion with the occurrence of abortion in women, since abortion appeared to be the only clinical sign of infection in the lower animals. As no evidence pointing in that direction was forthcoming, it seemed either that the bacillus abortus was not pathogenic for the human female, or that in ordinary circumstances opportunity for the infection of women seldom, or never occurred, and that there was no reason why bovine contagious abortion should be added to the list of animal diseases communicable to man. There is now available evidence to prove that the bovine disease must be so enrolled, and it is interesting to observe that an error in nomenclature was partly responsible for the delay in recognizing the fact. The error was that the causal organism of Mediterranean fever, discovered by Bruce, in 1887, was named the *Micrococcus melitensis.* It is now generally admitted that the organism in question is not a micrococcus, but the fact that it was so named tended to delay the discovery that the B. abortus was morphologically indistinguishable from it. That discovery was made by Evans, in 1902, but before that date other evidence incriminating the bovine bacillus as a cause of disease in man had come to light. It is now known that the resemblance between the two germs goes much deeper than their morphological character; it includes a similarity in cultural peculiarities, serological reactions, and pathogenic power for different animal species. At the present moment, the only matter that stands in doubt is whether the two organisms belong to the same species in the sense in which that word is applied in classifying the bacteria. And here it is advisable to take note of the fact that both the organisms have suffered a change of name, Micrococcus melitensis becoming *Brucella melitensis,* and Bacillus abortus *Brucella abortus;* and, further, that the human disease formerly termed Mediterranean or Malta fever is now known as Undulant fever.

Undulant fever has long been known as a disease of human beings prevalent in countries bordering on the Mediterranean Sea, and in respect of its etiology it first received fruitful investigation at the hands of an English Commission, in consequence of the serious incidence of the disease among the marines at the Naval Station in Malta. This led to the discovery of the germ of the disease by Bruce, and of the fact that the disease was primarily one of goats, from which it was conveyed to human beings who drank raw milk. Undulant fever—meaning thereby the disease in man—is a remittent fever, with a very characteristic temperature chart, from which it derives its new

name. The visible illness may last for weeks or months, and it is fatal in about 3 per cent. of cases. Prevention of the use of raw goat's milk had an immediate and striking effect on the incidence of the disease in the British garrison.

During recent years the disease appears to have made serious extensions, always connected with the spread of the infection among goats. Very important facts are that the disease is generally non-febrile in the goat, and that abortions are frequent in infected herds.

All these facts were for a time accepted without serious apprehension in other countries, because it was assumed that this undulant fever was an enzootic disease, affecting the goat only among the domesticated animals, and, consequently, that where goat's milk was not in use undulant fever in man was not likely to appear. This confidence was shaken when it appeared that in certain parts of the world cases of undulant fever in man had occurred independently of any disease in goats or the use of goats' milk. In a number of these cases serological and other tests agreed in showing that the illness of the patients was caused by the B. abortus—that is, the organism responsible for epizootic bovine abortion.

In a recent review (F. Huddleson) of the evidence of infection of human beings with the bacillus of contagious abortion it is stated that Malta fever is known to be endemic in the south-western part of the United States, and possibly in Mexico. The disease there is apparently identical with the one occurring in southern Europe in that it is contracted by drinking milk from infected goats. It has been found, however, that in the eastern, northern, and central States, cases have been occurring of a disease in human beings which runs a course resembling the genuine Malta fever, but is unconnected with the drinking of goats' milk. It is not known whether the disease is of recent occurrence, or has been in existence but not diagnosed for a number of years.

Orr and Huddleson investigated 33 cases of this disease occurring in man in different parts of Michigan, and found that there was no history that the patients had been associated with goats or ingested their products.

Many of the patients had a history establishing a connexion with abortion in cows, or of drinking milk from infected herds. In 50 per cent. of the cases in which the history of the patient pointed to possible infection from a bovine source contagious abortion was found to exist in the suspected herd.

Unfortunately, recent investigations have furnished further very strong evidence that the cattle disease is not without danger to the human species. The most striking of these was carried out in Denmark, by Dr. Martin Kristensen.* While working at the State Serum Institute, Kristensen thought it would be of interest to endeavour to discover whether any of the blood samples sent to the Institute from suspected cases of typhoid or enteric fever would, when tested, give evidence that the patient had been infected with the abortus. In the course of the year following 1st April, 1927, 2,500 samples from

* Extract from Epid. Report, Health Organization, League of Nations, No. 14, 1928.

about 2,150 patients were thus tested, and the result was the discovery of evidence that 222 of these patients had been infected with the B. abortus. The test applied to these samples was the agglutination test, which is now everywhere employed for the diagnosis of contagious abortion in cows, and it must be understood that if the same result had been obtained with blood from cows it would not have been doubted that the cows in question had been infected with contagious abortion.

Out of the samples of blood from 2,150 patients, 172 gave evidence of infection with typhoid and 126 with paratyphoid B., as against the 222 in which the result indicated infection with the B. abortus. It therefore appeared that in Denmark infection with the abortion bacillus is actually more frequent than infection with the germs of typhoid or paratyphoid B. fever. In five of the 298 cases which gave the typhoid or paratyphoid reaction there was also agglutination of the B. abortus, but in these five cases the condition of the patients indicated that the illness was probably caused by the B. abortus alone. In all the other cases that gave a positive reaction for the B. abortus the test for typhoid or paratyphoid was negative. Further, and not less important, in eighteen out of 27 cases in which a culture experiment with the blood was made B. abortus was found to be present. In the remaining nine cases no growth was obtained, but the symptoms presented by these were clinically the same as those presented by the eighteen in which culture experiments were positive. Fifty samples of serum were received at the Institute from a district in Greenland where there are no cattle, and in all of these the test for evidence of infection with the B. abortus was negative. Among the persons suffering from infection with B. abortus 40 lived in Copenhagen, 34 in other towns, and 146 in rural districts. Information about the probable source of infection was available for 209 of the persons whose serum agglutinated B. abortus, and it showed that 171 had been exposed to risk of infection while attending cattle, or had the double risk of such attendance and drinking raw milk or cream from infected cows. Not more than one case occurred in the same family, and the cases were not specially numerous in any particular part of the country.

What these results prove is that in Denmark also there are occurring among human beings cases of febrile disease resembling the undulant fever of Southern Europe, and caused by the bacillus of cattle abortion, and investigations on similar lines have had the same results in the United States, Holland, and Sweden.

Lastly, in this connexion it must be mentioned that recently in England several cases of what appeared to be undulant fever have been reported in which the disease must have been contracted locally.

The conclusion that must be drawn from the foregoing facts is that the disease of cattle termed contagious or epizootic abortion is communicable to man, in whom it takes a form indistinguisable from the undulant fever of the Mediterraneau. Probably about 30 per cent. of all the cows in Europe are affected with the disease, and about 10 per cent. pass out abortion bacilli in their milk. The facts are serious, but need not occasion a panic. There has been no sudden change in the circumstances, but these have been rather suddenly apprehended.

It is comforting to know that even in the Malta garrison before any precautions were taken the incidence of the disease was less than 5 per cent. per annum, although 50 per cent. of the goats were infected, and there is reason to believe that many of them yielded milk much more heavily charged with the bacilli than is usual in cows. There is also a possibility that the bacilli derived from cows are less virulent for man than those from goats.

In Sweden, undulant fever has already been made a notifiable disease, and the Ministry of Health may think it advisable to do the same here in order to discover to what extent the infection is being passed on from cattle to man in Great Britain. That is not yet known for any country, but there is no ground for hoping that it is less here than any of the countries already mentioned. Doubtless when attention is turned to the disease it will appear to become more frequent, and there will be a danger of hasty and ill-considered action. Meanwhile, housewives can be assured that boiling of the milk is a perfectly certain means of prevention, and, indeed, a temperature much below the boiling point can be relied upon to destroy the bacilli.

At first sight it appears to be a very remarkable fact that it has taken more than 30 years after the discovery of their respective germs to prove the identity of contagious abortion in cattle with undulant fever in the goat and in man, but very little retrospection is necessary to show why the discovery was so long delayed. A contributory fact was the misnaming of the organism proved by Bruce to be the cause of Malta fever, for, after Bang's description of the B. abortus, that was almost certain to put "off the scent" any one speculating as to whether the disease among the goats in Malta might be identical with contagious abortion; and another was that the description of the cultural characteristics of the Malta fever germ was incomplete. But, most of all, the mere suspicion of the identity was prevented by the apparent fundamental clinical differences between contagious abortion and Malta fever as it affected the human subject. The bovine disease was without effect on the animals' general health, the human was a serious, and sometimes fatal, fever. The one was essentially a metritis, and the common method of infection was supposed to be copulation; in the other, infection was mainly, if not exclusively, by ingestion.

[Reprinted from *The Journal of Comparative Pathology and Therapeutics* for September, 1929.

PIG KEEPING.

STY v. OPEN-AIR METHODS.

By A. J. Gill, Senior Herd Tester.

The Pig—Usually an Ill-treated Animal.

Even under the present unsatisfactory conditions the pig industry is worth one and a half million pounds sterling annually. Few people realize this.

Unfortunately, very few farmers regard pig-raising as capable of being made a main source of income, or even an important side-line.

The pig is regarded in the light of a scavenger that will consume household scraps and surplus milk. When food is plentiful the pig is well fed, when scarce he is starved. It comes as a surprise to many farmers to find that the earning capacity of the sow equals, and frequently surpasses, that of the cow, and there is less labour involved in looking after pigs than in feeding and milking cows. No other animal on the farm can give such good returns, and certainly there is no other so little understood, so ill-treated, so often underfed, and kept under such filthy conditions.

To some the word pig is synonymous with dirt and filth, and a visit to many farms on which pigs are kept undoubtedly helps to confirm this notion. The sties are usually low, dark, and small, the floors covered with manure and filth to a depth of several inches. Of course, the pig is dirty under those conditions; he cannot be otherwise. It is because the pig is generally kept under these conditions that the industry is not more profitable. The heavy mortality amongst young pigs is very high, and no wonder. It takes twice the amount of food to fatten pigs housed in narrow, vile-smelling sties that it does to fatten those in reasonably clean surroundings. It is hard to understand why a farmer will persist in making his sties low and dark. They have many disadvantages, but no advantages. They are difficult to keep clean, for one can enter them in a crouching position only.

The Sty Usually Unnecessary.

In a few cases where a large number of pigs have to be kept in a small area, near a town for instance, where refuse is obtainable, sties, of course, are essential. But why not erect suitable buildings, wherein there is provision for plenty of light and air space, with walls high enough to ensure comfort?

In most places, however, sties are unnecessary; they are expensive to build, a trouble to clean, and it costs more to fatten pigs housed in them than is the case when animals are run on pasture. The pig is naturally an out-of-doors animal. Sows kept on pasture will be healthier than those kept in sties, and they will have larger and healthier litters, and the young will grow better. Of course, when a sow is heavy in young or is suckling a litter it will be necessary to supplement the pasture with a balanced grain ration.

If one visits an up-to-date pig-farm where the animals are kept on pasture, one will be struck by the cleanliness and freedom from

objectionable smells. Given the opportunity, the pig will be as clean as most farm animals. The open-air method means healthier pigs, cleaner surroundings, and increased profit.

There is an idea held by some people that pigs cannot be reared profitably without milk. There are farms in this State where large numbers of pigs are reared and fattened, yet neither the sows nor the young are ever fed milk. They are run on pasture, and in addition are given gristed grain and meat meal.

Some years ago a feeding test with pigs in yards and sties was being conducted by this Department, and one day a number managed to get out of the yards into a lucerne paddock. At the end of the test when the weights were being checked it was noticed that the greatest increase in any period was during that week in which the animals had broken into the lucerne paddock. It was this that turned attention to the value of pasture.

Tests had been made in grazing pigs on lucerne and feeding them maize in addition. When on the lucerne they ate 3½ lb. daily, but when removed from the lucerne they required double the quantity of grain. This proves how much the pasture cuts down the grain bill. However, the combinaton of maize and lucerne is not recommended; it produces a soft, inferior bacon. Maize alone will not give first class bacon; I would never advise using more than 50 per cent. maize in any grain mixture. Wheat, barley, pollard, and oats—the feeding of any of these will produce a good quality of bacon. The feeding of peas alone will result in a very hard, lean bacon. If fed as 25 or 30 per cent. of the ration good results should be obtained.

Tests carried out at Mr. Thompson's farm at Pakenham, and at Mr. Purnell's farm at Moriac, and at other places, give conclusive proof of the superiority of the open-air method over that of the sty. There was a doubt as to whether the grass and grain-fed pigs would produce a good quality of pork and bacon. Therefore butchers and bacon factory managers were asked for their views, and there was such a remarkable agreement in the reports received that the Departmental officials began to recommend the open-air method of pig-keeping, and have been doing so for the last six years. This system has been adopted in many parts of the world. We are particularly fortunate in that our climate is so mild that pigs may be run in the open the whole year round.

When pigs are being fattened in the open, it is best to feed the grain in a dry state through an automatic feeder. All grain should be gristed; if fed whole a large percentage of the grains will pass through undigested. Suppose, for instance, barley is worth 4s. per bushel, and one-third of the quantity is not being actually digested, it means that the real cost of the grain is 5s. 4d. per bushel, and thus the outlay for fattening a pig is increased by approximately 13s. 6d. It is only by paying attention to these details that pig-farming can be made payable to the highest degree. One sometimes hears of farmers marketing their pigs as baconers at five months; with others they are not fit for the market till they are seven months.

Of course, the older the pig the more food required to produce a pound of pork, and so the expense increases. Some pigs will yield 1 lb. of pork for every 4 lb. of grain consumed, while others, which for

some reason do not thrive well, will require 6 lb. of grain to produce 1 lb. gain. This means a difference of 2d. in the cost of producing 1 lb. of pork; thus, with pigs weighing 180 lb. each the variation in the cost of fattening would amount to 30s.

I have carried out feeding tests in which pigs showed only a profit of 2s. 6d. per head, and on the same farm with the same breed of pigs, after adopting different feeding methods, have seen a profit of £2 per head obtained. This may seem almost incredible, but as I weighed the pigs and recorded the cost of feed I am quite sure as to the accuracy of the figures.

One of the latest experiments carried out in the open-air feeding of pigs was at Mr. Purnell's farm, Moriac.

The Value of Pasture.

In one paddock pigs were fed a balanced ration of 1 to 4; in another paddock they were allowed a free choice or, in other words, allowed to balance their own ration. For the first month the pigs on the 1 to 4 ration gained considerably over the others; after that the free choice lot overtook them, and at the end of the test it was ascertained that the cost of fattening them was 10s. 3d. less per head. Their choice of a ration worked out at 1 to 5. At the time of the test there was a nice growth of young grass in the paddocks, which would have had a nutritive ratio of about 1 to 3. The narrower ration, with a large percentage of protein, while giving good results with the pigs when just weaned, did not continue to do so as they grew older and required more carbohydrates. The free choice method is still being tried by Mr. Purnell, and it is very noticeable that as the grass dries the pigs consume more meat meal. Young grass and clovers make a very valuable pasture for pigs, and while it is at this stage pigs require little meat meal.

Mature pigs will fatten on pasture alone; young pigs, however, will not, though they will grow to a normal size. Now and again one will hear of a sow rearing a litter while receiving no other feed than grass; but probably not more than one sow in 50 is capable of doing this. The great majority must be fed while suckling their young, and will give best results on a ration having a nutritive ratio of 1 to 4. A sow running on pasture will usually require 1 lb. of grain for each young one in the litter and about 2 lb. in addition.

Necessity for Weighing, Culling, and Selecting.

There is one feature I wish particularly to bring under notice; that is the need to note the capabilities of sows as breeders and to keep records of each litter. Some pigs may fatten at the rate of 1½ lb. per day, and some at only ½ lb. per day. This means that it costs more to market some pigs than is the case with others. But if one keeps on weighing and culling and selecting, one will soon find that there will be a saving of at least 1 lb. of food for every pound of pork produced. This perhaps does not seem much, but in every litter of ten fattened for baconers it would mean an additional £7 10s. profit, and as a sow has two litters in a year, the value of her litters would be increased by £15 annually.

In Europe, where testing has been carried out for several years, pigs are now bred that can produce a pound of pork for 1 lb. less food than is required by the average pig in England. The little labour required for testing will soon be well repaid. The use of the scales is essential; one cannot guess the weight of the pig, nor of its food. A simple method of distinguishing pigs by ear-marks was given in this *Journal* for October, 1929.

Mineral Matter Essential in Feed.

There is one thing frequently overlooked; it is the need for mineral matter. The cheapest way to supply this is by giving a liberal supply of charcoal and ashes, but if these are not available bone-flour should be given; it may be mixed at the rate of from 2 to 3 lb. in every 100 lb. of grain.

In balancing a ration for pigs running on pasture, 10 lb. of meat meal and 8 lb. of linseed meal to every 100 lb. of grain will give a nutritive ratio of 1 to 4. This is excellent for weaners. After the first three weeks the quantity of meat meal may be reduced to 8 lb. and the linseed meal to 6 lb. After a further fortnight the allowance may be lowered to 6 lb. and 4 lb. respectively. The reason for reducing the quantities of the meals is that, as the pig grows older, he thrives better on a broader ration; he requires a larger percentage of carbohydrates, and to continue feeding a high percentage of meat and linseed meal makes the ration expensive without giving any corresponding advantage.

The quantity of food eaten by young pigs on pasture can as a general rule be estimated at about 1 lb. per day for each month of age; for instance, at two months the young pigs eat 2 lb. daily, at three months 3 lb. daily, and so on.

I have known pigs running on pasture to increase 1 lb. in weight for every 3½ lb. of food consumed. When grain, &c., is obtainable at 1d. per lb., such a result yields a very good profit.

Young leafy grasses, clovers, lucerne, rape, green oats, and barley all make excellent pasture for pigs. Better results can be obtained from mixed grains than from the feeding of one variety. Whether in sties or on pasture pigs should be provided with a good supply of drinking water.

REMINDERS FOR MAY.

LIVE STOCK.

Cattle.—Cows may be rugged to advantage at night and on cold days. Give a ration of hay or straw, whole or chaffed, to counteract the purging effects of young grass. Don't deny the extra food necessary to satisfy the winter appetite. Cows close up to calving, especially if in good condition, should have their diet reduced to much below what rich young grass supplies Newly-born calves will now be better for a dry, warm shed. See that calves over a week old have freedom to romp, and a dry and sheltered camping place.

Pigs.—Sows not already served should be put to the boar. Supply all pigs with plenty of bedding, and see that sties are warm and well ventilated. Supply sows in pig with a balanced ration. Castrate young boars as early as possible.

Pigs should be highly profitable now, as pork is a good price. Rape, barley (especially skinless), oats, &c., may be sown for grazing during winter. Pigs should be supplied with plenty of charcoal and bone meal.

SHEEP.—Lambing is in full swing during the month of May—particularly in the warmer districts. Ewes should be kept in strong condition—neither too fat nor excessively fat. When the lambs are dropping, the most liberal treatment possible so far as concerns feed, shelter, and general attention pays; this care should be continued until the lambs are weaned.

Self-preservation being such a very strong factor in nature, it follows that badly-fed ewes will make bad mothers. Very old or very young ewes, if underfed, are usually very neglectful of their new-born lambs.

Late April and early May lambs may be marked towards the end of May. This work should be done in fine weather, and, if possible, most of the marking should be completed by, say, 3 p.m., so as to allow the lambs to mother before the evening sets in. It is advisable to yard lambs with their mother the night before marking, so that the work will not be undertaken when the lambs are overheated. The work should not be done in dirty yards, and the use of temporary enclosures is recommended. Plan of same may be obtained from the Department on application. A rest after the operation is also advisable to permit of a lessening of the blood-flow from the wounds before travelling. Every precaution must be taken to prevent deaths from tetanus or lock-jaw, or from blood poisoning, which troubles frequently occur as a result of docking lambs in filthy yards, and from using filthy instruments. Before commencing, all knives, pliers, &c., should be thoroughly cleansed and disinfected in a solution of one part carbolic acid to twenty parts of water; they should also be frequently disinfected while in use.

Most flock-owners are agreed that the purse of male lambs should be drawn tight by the fingers, and the end completely severed. Slitting the purse is far too tedious, and is not recommended in any circumstances. In tailing, never draw tails tight, as the projecting bone will delay healing; particularly so if hot blades are used. Even when the cutting is done with a knive, enough loose skin should be left to cover the bone and veins so as to check the strong flow of blood which usually occurs in lambs of well-fed mothers. Losses should be avoided in every possible way.

If not already done, sheep should now be crutched, as the young grass of May tends to cause scour. Wool-blindness in fine-woolled sheep may now need attention. In wet districts, dry paddocks should be used to the full extent. A sharp look-out must be kept for such pests as foxes, rabbits, eagles, dogs, &c.

POULTRY.—Feed animal food to forward pullets, about ½ oz. daily, and equal parts heavy oats and broken maize at night. Succulent greenstuff should be fed daily. See that fowl houses are free from draughts to avoid colds, also that they are free from red mites. Use Epsom salts and sulphur once a week to avoid Roup and Chicken Pox.

CULTIVATION.

ORCHARD.—Plough, manure; apply lime to orchard lands at rate of 5 or 10 cwt. per acre where soil is sour. Spray trees infested with scale insects, Woolly Aphis, and Bryobia Mite with red oil or crude petroleum. Clean all rough bark from trees. Commence pruning early varieties at end of month. Pick up and boil all fallen fruit.

FLOWER GARDEN.—Digging, manuring, and pruning; trench and drain where necessary. Dress the surface with lime. Continue to sow hardy annuals. Bury all leaves, soft-wood cuttings, and weeds. Continue to plant spring blooming perennials and other plants. Plant cuttings of carnations and roses.

VEGETABLE GARDEN.—Cut down and clean out asparagus beds. Apply manure and lime dressings. Cultivate deeply. Plant out seedlings and early potatoes; sow peas, broad beans, carrots, and parsnips.

VINEYARD.—Subsoil land for new plantations if not already done. This work should be carried out as long before planting as practicable. Vine-growers are warned against the too common practice of feeding off foliage after vintage. Any small advantage in the form of stock feed is only gained at the cost of a reduction in the following season's crop, owing to interference with accumulation of reserves which continues so long as the leaves remain green. Sheep or other animals should not be allowed into the vineyard until the leaves have changed colour. Early and deep ploughing is strongy recommended. Manures should be applied as early as possible. Peas, &c., for green manuring, should be sown without delay, in order to take advantage of early rains.

Cellars.—Rack or fill up (preferably the former) dry wines as soon as a lighted match, introduced at bung hole, is no longer extinguished. Sweet wines should also be racked and fortified to full strength.

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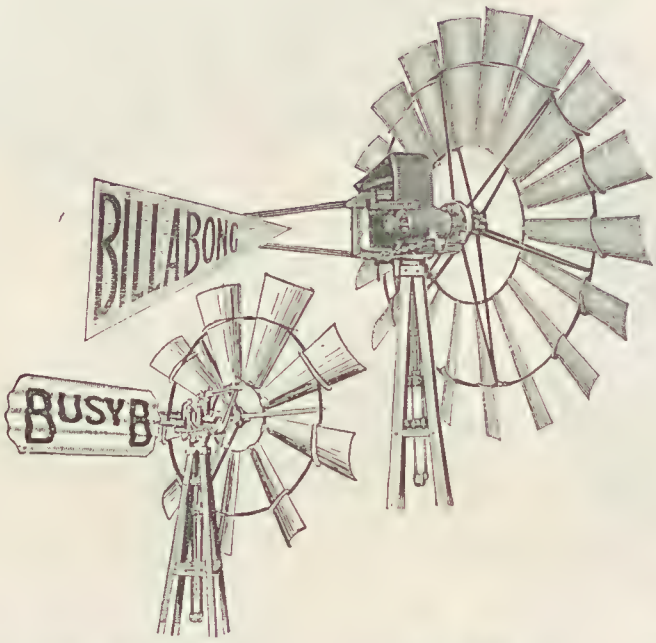

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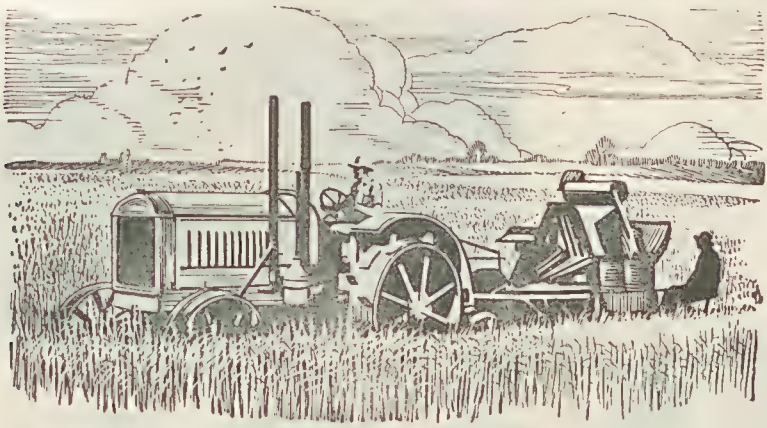

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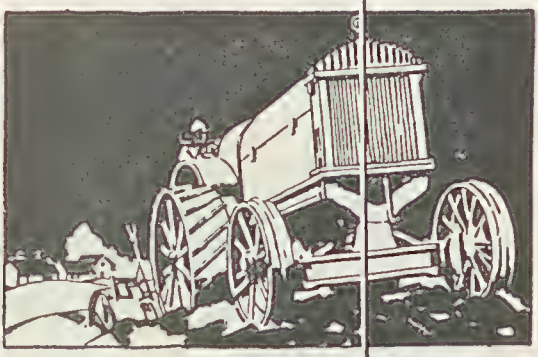

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